FACTORS INFLUENCING COLLEGE TEACHING SELF-EFFICACY OF SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS GRADUATE TEACHING ASSISTANTS

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ABSTRACT

FACTORS INFLUENCING COLLEGE TEACHING SELF-EFFICACY OF SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS GRADUATE TEACHING ASSISTANTS

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This study aimed to test a statistical model among GTA teaching self-efficacy, instructor's teaching support, departmental teaching support, teaching experience of GTAs, number of courses they assisted, mastery experiences, and value they attribute to college teaching through structural equation modeling. Data were collected from 302 GTAs (159 female, 142 male) studying science, technology, engineering, and mathematics (STEM) disciplines with a response rate of 30.82%. In order to collect data, GTA Survey Instrument was developed and this instrument included following sections: GTAs' demographic information and teaching profile, mastery experience, value attributed to college teaching, teaching self-efficacy, teaching experience, instructor's teaching

support, and departmental teaching support. In this study, DeChenne (2010)'s GTA Teaching Self-Efficacy Scale was adapted to Turkish in order to measure GTA teaching self-efficacy. Current study provided valid and reliable findings for the adapted version of the scale. In addition, other sections also showed satifactory psychometric characteristics.

Analysis resulted in a moderate fit with the following indices: χ^2 (1449, n = 302) = 2351.90, p = .00, CFI = .91, NNFI = .90, RMSEA = .05, and SRMR = .08. Mastery experience and value attributed to college teaching were found as significant predictors of GTA teaching self-efficacy. Departmental teaching support had an influence on teaching self-efficacy through value, whereas teaching approach and teaching support of instructor were found as non significant in estimating teaching self-efficacy. Mastery experience was also significantly predicted by number of courses assisted and teaching experience. The model explained 72% of variance in GTA teaching self-efficacy.

Keywords: College Teaching Self-Efficacy, Graduate Teaching Assistant, Science Technology Engineering Mathematics (STEM) Departments

ÖZ

FEN, TEKNOLOJİ, MÜHENDİSLİK VE MATEMATİK BÖLÜMÜ ARAŞTIRMA GÖREVLİLERİNİN ÜNİVERSİTEDE ÖĞRETİME YÖNELİK ÖZYETERLİĞİNE ETKİ EDEN FAKTÖRLER

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Bu çalışma, araştırma görevlilerinin üniversitede öğretime yönelik özyeterlikleri, öğretim üyelerinin desteği, bölümün öğretim desteği, araştırma görevlilerinin öğretim deneyimi, asistanlık yaptıkları ders sayısı, doğrudan deneyimleri ve üniversitede öğretime verdikleri değer arasında istatistiksel bir modeli Yapısal Eşitlik Modeli ile test etmeyi amaçlmıştır. Araştırma verileri, %30.82'lik bir geri dönüş oranı ile, fen, teknoloji, mühendislik ve matematik disiplinlerinde eğitim alan 302 araştırma görevlisinden toplanmıştır. Veri toplamak amacıyla Araştırma Görevlileri Araştırma Anketi oluşturulmuştur. Bu anket, yedi bölümden oluşmakta ve araştırma görevlilerinin demografik bilgileri ve öğretim profilleri, doğrudan deneyimleri, üniversitede öğretime verdikleri değeri, öğretime yönelik özyeterlikleri, öğretim deneyimleri, öğretim üyelerinin

kendilerine sağladıkları desteği ve bölümün öğretim desteği bölümlerini içermektedir. Bu çalışmada, araştırma görevlilerinin öğretime yönelik özyeterliğini ölçmek için DeChenne (2010)'nin Araştırma Görevlileri Öğretime Yönelik Özyeterlik Ölçeği Türkçe'ye uyarlanmış ve çalışmada uyarlanılan versiyon için geçerli ve güvenilir sonuçlar elde edilmiştir. Ayrıca anketin diğer tüm bölümleri de uygun psikometrik özellikler göstermiştir.

Analiz sonuçlarına göre model veri ile uyumludur: χ^2 (1449, n = 302) = 2351.90, p = .00, CFI = .91, NNFI = .90, RMSEA = .05 ve SRMR = .08. Doğrudan deneyim ve üniversitede öğretime verilen değerin, üniversitede öğretime yönelik özyeterliği anlamlı bir şekilde yordadığı bulunmuştur. Öğretim üyesinin öğretim yaklaşımı ve öğretim desteği, öğretime yönelik özyeterliği açıklamada anlamlı bulunmamışken, bölümün öğretim desteği, değer üzerinden öğretime yönelik özyeterliğe etki etmektedir. Doğrudan deneyim, asistanlık yapılan ders sayısı ve öğretim deneyimi tarafından anlamlı bir şekilde yordanmaktadır. Model, araştırma görevlilerinin öğretime yönelik özyeterliğindeki varyansın % 72'sini açıklamıştır.

Anahtar Kelimeler: Üniversitede Öğretime Yönelik Özyeterlik, Araştırma Görevlisi, Fen Teknoloji Mühendislik Matematik (FTMM) Bölümleri

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ABBREVIATIONS

CFI: Comparative Fit Index

GTA: Graduate Teaching Assistants

NNFI: Non-normed Fit Index

RMSEA: Root Mean Square of Approximation

SEM: Structural Equation Modeling

SRMR: Standardized Root Mean Square Residual

STEM: Science, Technology, Engineering, and Mathematics

CHAPTER I

INTRODUCTION

1.1 Background of the Study

In the last decade, instructional development has become especially an important issue. Training programs on instructional skills such as classroom management, instructional methods, assessing student performance and proving feedback, and administrative procedures are formally offered at some universities as a part of the faculty development programs. These programs include courses, seminars, and training sessions designed for both faculty members and graduate teaching assistants (GTAs).

According to Dalton (1988), faculty development refers to all the instructional activities, which are organized to increase knowledge and skills of the faculty. Some of these activities are designed to train faculty members to contribute their instructional development. Briggs (1970) defines instructional development as skill improvement in course design, development, and evaluation. Furthermore, Stes and Petegem (2011) clarify the aim of instructional development as to prepare faculty members for their teaching role. According to Spitzer (1976), who has a more student-centered approach, instructional development contains

design of teaching units and instructional materials that can meet the needs of specific students.

Faculty development program is a wide concept to identify all activities designed to improve instructors' skills in instruction, research, and service (Amundsen, Abrami, McAlpine, Weston, Krbavac, Mundy, & Wilson, 2005). To be more specific, Steinert, Mann, Centeno, Dolmans, Spencer, Gelula, and Prideaux (2006) propose that faculty development programs should provide training for the development of instructional skills and use of assessment techniques, planning or implementing curricula, improving student–faculty relationship, and devotion for educational scholarship. Despite similar services provided both for faculty members and GTAs, Jarvis (as cited in Kabakci & Odabasi, 2008) recommends the following for faculty development programs, which are organized for GTAs: (i) conducting interviews with GTAs to plan and evaluate the faculty development programs, (ii) setting reward criteria to support the development of GTAs, (iii) offering a variety of programs for specific fields of profession, and (iv) integrating educational technology in the instructional activities.

Support for GTAs in teaching is categorized into two: one being the formal training programs and the other being the interactions with tenured faculty members (Wise, 2011). Austin (2002) pointed out that one of the characteristics of graduate education is being a phase for preparing a graduate student for his future faculty role. Compared to training programs, unstructured interactions with faculty members, such as assisting a course, discussing on daily teaching

practices, or observing faculty's interactions with students, were found to be more significant experiences to develop teaching skills (Austin, 2002). For example, Shannon, Twale, and Moore (1998) found inverse correlation between student evaluations about GTAs and length of GTA training. Additionally, Prieto and Altmaier (1994) tested the relationship between teaching self-efficacy and GTAs demographic variables such as gender, ethnicity, previous experience, and prior training via regression analysis. They reported that training of GTAs explained a low portion of variance in teaching self-efficacy, while nearly half of the variance was explained by previous teaching experience.

A GTA is an important member of a faculty considering his/her multiple roles in administration, research, secretariat, and instruction. In administrative and secretarial tasks, GTAs still can get support from other members of the department and the secretary. They also experience research process either in courses or in their advisors' or their own research studies. However, a GTA tries to learn the role of teaching by directly being given the duty of instruction. Especially in science, technology, mathematics, and engineering departments, GTAs experience teaching via assisting lab sessions of the courses and leading recitation hours (Golde & Dore, 2001). Their teaching abilities can also be developed by participating faculty development programs such as seminars and workshops on instructional techniques and assessment, microteaching sessions, and roundtable activities with the participation of experienced faculty members. Although there are training programs abroad to prepare GTAs for the former tasks mentioned, no formal training is required for GTAs from all disciplines in Turkey. Therefore, they can feel lonely while acting as an instructor or

performing some instructional duties like grading, communicating with students, and managing lab sessions. In Turkey, teaching assistants develop their teaching skills and repertoire while assisting the course instructor. Such skills and repertoire which GTAs gain on their own are called *mastery experience*. These mastery experiences are expected to promote their self-efficacy in teaching (Bandura, 1997). There are three more sources of self-efficacy: *vicarious experience, verbal persuasion,* and *emotional arousal*. In teaching context, vicarious experiences are teaching performances of other teachers while verbal persuasion refers to feedback on teaching performance (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998). Observing teaching practices of instructors is an example for vicarious experiences considering the GTA context. GTAs who got feedback from instructors on their teaching performance and who are encouraged to try new methods in teaching are verbally persuaded according to Bandura. In addition to these sources, Tschannen-Moran et al., (1998) proposed an another factor, *analysis of teaching task,* which has an influence on teacher self-efficacy. This analysis results in inferences on the difficulty of teaching task. Teacher self-efficacy is defined as "teachers' beliefs or conviction that they can influence how well students learn, even those who may be considered difficult or unmotivated" (Guskey & Passaro, 1994, p. 628). Self-efficacy in teaching has been considered as an important factor in commitment to teaching, student achievement, and openness to alternative methods in teaching, and other instructional practices (Ross, Cousins, & Gadalla, 1996; Tschannen-Moran et al., 1998). Teaching self-efficacy is a construct that develops in the beginning of the instructional career but keeps its stability after a while (Tschannen-Moran et al., 1998). Therefore, it

is important to understand teaching assistants' self-efficacy in teaching and its correlates.

Despite vast number of studies in K-12 education, teaching self-efficacy has not been explored much in higher education. Commonly, the relationship between teaching self-efficacy and teaching experience was examined but findings are contradictory. For example, Tollerud (1990) found that teaching experience has a significant relationship with teaching self-efficacy of GTAs in counseling psychology department. This finding was confirmed in the studies of Prieto and Altmaier (1994), Liaw (2004), and Prieto, Yamakoski, and Meyers (2007). Moreover, Prieto and his colleagues (2007) found a significant difference in GTA teaching self-efficacy based on different teaching roles (i.e., grader, lab assistant). Teaching self-efficacy of GTAs who have non-instructional roles like grading was found to be lower than that of GTAs assisting a course. On the other hand, Burton, Bamberry, and Harris-Boundy (2005) found non-significant relationship between teaching experience and college teaching self-efficacy in a study with GTAs.

Researchers in Turkey so far have focused on the needs of faculty members rather than examining particular variables, such as teaching self-efficacy, value of teaching. For instance, Moeini (2003) conducted a need assessment study on faculty development needs in a technical university. His findings indicated that both instructors and GTAs need training to develop instructional skills. In a survey study, Kabakci and Odabasi (2008) collected data from GTAs working at

faculty of education. Their study resulted in the need for developmental programs in a workshop format.

The current study is an attempt to examine STEM GTA's teaching self-efficacy and contribute to the literature by studying its relationship with other variables. With this aim, relationship among GTA teaching self-efficacy, instructor's support for teaching, departmental teaching support, their teaching experience, number of courses they assisted, mastery experiences, and value they attribute to college teaching is tested through a statistical model.

1.2 Purpose of the Study

The purpose of the current study was to test a structural model among the variables including GTA teaching self-efficacy, their instructor's support for teaching, departmental teaching support, their teaching experience, number of courses they assisted, mastery experiences, and value they attribute to college teaching. The sample included GTAs who work in science, technology, engineering, and mathematics (STEM) departments of four different public universities in Ankara, Turkey. Among the model variables, the frequency of experiencing different instructional practices (e.g., grading, motivating students, and managing disruptive students), mastery experience, and number of courses GTA assisted included in the model to represent the quality and the quantity of teaching experience. While support taken from instructors refers to individual support of closely worked instructor and his approach to teaching,

departmental teaching support is an indicator of all instructors' attitude toward GTAs in the department. Besides, support taken from instructors is measured by two factors: teaching approach and instructional support for GTA. Moreover, teaching self-efficacy in college teaching is presented as a latent construct measured by two factors named as learning environment and instructional strategies. The conceptual model is presented in Figure 1.1.

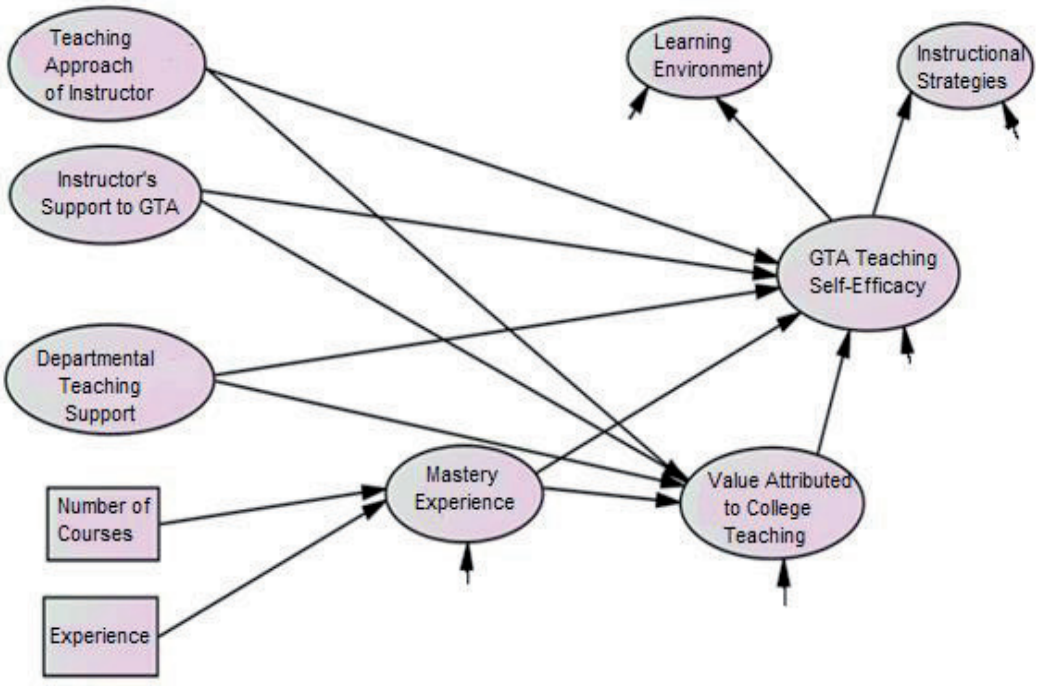

Figure 1.1 Conceptual Model Displaying the Relation between Study Variables

1.3 Significance of the Study

Faculty development includes all the activities designed to develop faculty's skills as instructors and researchers (Eble & McKeachie, 1985). In this scope, there are training programs, seminars, workshops, and activities for GTAs as for tenured faculty members. Contributing teaching experience of GTAs is possible by teaching them *how to teach* besides providing support on *what to teach.* Teaching experience is an important source for GTAs to learn how to teach and develop themselves for their future role as an instructor. Experience is also a way to get feedback on teaching performance from both students and faculty members (Shannon et al., 1998). GTAs who had more teaching experience were evaluated as effective instructors by university students (Ferris, 1991). In addition, teaching experience and training on teaching help GTAs improve self-efficacy in teaching (Prieto & Altmaier, 1994).

In the current study, a structural model examining the relationship among GTA teaching self-efficacy, instructor's teaching support, departmental teaching support, teaching experience, number of courses they assisted, mastery experiences, and value they attribute to college teaching was tested. For this purpose, GTA Teaching Self-Efficacy (DeChenne, 2010) was adapted and validated for Turkish context. Moreover, the structural model testing findings are intended to make contribution to the understanding of teaching experience of GTAs, departmental support received related to teaching, value attributed to college teaching, and level of their self-efficacy in teaching. Especially, findings will contribute to literature on GTA teaching self-efficacy. In Turkish literature,

there is no study examining GTA teaching self-efficacy in such a comprehensive view. Through model testing, factor(s) involved in teaching self-efficacy (learning environment and instructional strategies) that have a relationship with teaching experience, value attributed to teaching, and departmental teaching support are examined additionally. Departmental support is a part of departmental teaching climate and includes support for innovative ideas and resources for teaching and training to improve the existing skills (Notarianni-Girad, 1999). Support issue is explored through items measuring at what level instructors in the department provided help for the new teaching approaches and shared teaching related ideas and experiences. It is important to understand whether these dimensions have an influence on GTA teaching self-efficacy, because departmental factors such as supervision, support, and training are considered influential for self-efficacy in college teaching (Prieto & Meyers, 1999; Prieto, Yamokoski, & Meyers, 2007). As opposed to the previous studies, which explored these factors without a holistic approach, the relationship between previously mentioned variables is examined in a model in the current study. The proposed model is expected to help experts dealing with faculty development through clarifying the relationship between teaching experience, GTA teaching self-efficacy, departmental climate, and value attributed to teaching.

Self-efficacy in teaching has an influence on teacher retention and student achievement (Tschannen-Moran et al., 1998). Another important characteristic of self-efficacy comes from its predictive nature. Self-efficacy of an individual is an indicator of his or her future performance (Bandura, 2006). Therefore,

understanding GTA teaching self-efficacy will give an idea on their future performance as an instructor. Teacher self-efficacy becomes resistant to change in the later years of teaching (Tschannen-Moran et al., 1998). Most importantly, positive self-efficacy belief helps to develop positive attitudes toward teaching when it is developed in the early years of teaching experience (Woolfolk-Hoy & Burke-Spero, 2005). In terms of developing positive self-efficacy beliefs, early years are critical for GTAs. Therefore, it is important to study the potential constructs that have a relationship with GTA teaching self-efficacy, because enhancing these factors can contribute to development of self-efficacy.

1.4 Definition of terms

Self-efficacy is the belief in one's capabilities to organize and execute the courses of action required to produce given attainments (Bandura, 1997, p. 3).

Teacher self-efficacy is teachers' beliefs or conviction that they can influence how well students learn, even those who may be considered difficult or unmotivated (Guskey & Passaro, 1994, p. 628).

College teaching self-efficacy refers to teaching self-efficacy of faculty members, i.e. their belief in their ability to perform teaching at college level.

GTA teaching self-efficacy refers to GTA's belief in her or his ability to perform teaching at college level.

Mastery experience is one's personal experiences and it is the most influential source of self-efficacy (Bandura, 1997).

Verbal persuasion is the verbal judgements that others provide on performing a task (Bandura, 1997).

Vicarious experience refers to experiences in which the skill in question is modeled by someone else.

Emotional arousal is the state of emotions such as mood states, stress, and anxiety (Bandura, 1994).

CHAPTER II

REVIEW OF LITERATURE

2.1 Self-Efficacy

Self-efficacy is a construct that refers to one's beliefs in performing a specific action in a particular context (Bandura, 1986). This construct is based on two theories: Rotter's Social Learning Theory (1966) and Bandura's Social Cognitive Theory (1986). The emphasis of Rotter's Social Learning Theory (1966) was on the *locus of control,* which was defined as beliefs on expectations influenced by internal and external factors. The second theory focuses on "casual beliefs about the relationship between actions and outcomes" (Bandura, 1997, p.20). Bandura's theory was utilized in the study of RAND Corporation in 1976 in which teacher's impact on student motivation was measured using two items (Armor et al., 1976). In Bandura's Social Cognitive Theory (1986), a triadic reciprocity is defined among three determinants: personal, environmental, and behavioral. These factors influence each other mutually and none of them is superior to the others (Bandura, 1986). Personal factors include cognition, affect, and physiological states, while environmental and behavioral factors are more extrinsic, i.e., observable (Pajares & Usher, 2008).

Bandura (1991) differentiates self-efficacy from locus of control by stating that self-efficacy refers to beliefs about one's own performance whereas locus of control corresponds to the beliefs about the performances, which has an impact on the outcome. Self-efficacy is an essential construct because it has an impact on personal preferences and contributes to the interpretation of skills according to Bandura (1997). Not the actual performance but how it is perceived by the individual is a self-efficacy issue (Tschannen-Moran et al., 1998). In triadic reciprocity, self-efficacy beliefs are defined under the personal determinants. Another factor that makes this construct important is its influence on perseverance and effort. Highly efficacious people have a tendency to be more resilient in difficult situations (Bandura, 1997). For instance, teacher burnout, defined as emotional exhaustion due to work (Maslach & Jackson, 1981), is negatively correlated with teacher self-efficacy (Evers, Brouwers, & Tomic, 2002).

Another discriminating characteristic of self-efficacy is being task- and situation-specific (Bandura, 1997), i.e., self-efficacy beliefs of people can change in different circumstances and depend on the type of task. For example, a college student may have high self-efficacy in mathematics while he or she may not appreciate his or her performance in chemistry in the same manner as he or she did in mathematics. Self-efficacy measures should be determined based on particular tasks and situations such as teaching self-efficacy, academic self-efficacy, problem-solving self-efficacy, and driving self-efficacy.

Self-efficacy is developed through the contribution of four sources: enactive mastery experiences, vicarious experiences, social persuasion, and physiological and emotional states (Bandura, 1986). Mastery experience is proposed to be the most influential source of self-efficacy since repeated successful experiences will increase the level of self-efficacy (Bandura, 1982). Successful performance of another person in a specific task can result in the improvement of one's self-efficacy and this performance is called vicarious experience. As the third source of self-efficacy, social persuasion has an impact on effort which people make towards mastering a task. Verbal persuasion can make people believe that there is no reason to avoid difficulties. Finally, stress, aches, pain, depression, and positive/ negative mood are the examples of physiological and emotional states (Bandura, 1994).

2.1.1 Teacher self-efficacy beliefs

Teacher self-efficacy belief has been defined by various researchers (e.g. Armor et al., 1976; Berman, McLaaughlin, Bass, Pauly, & Zelman, 1977; Gibson & Dembo, 1984; Guskey & Passaro, 1994; Tschannen-Moran et al., 1998) and it refers to the teachers' beliefs in their capacity to contributie to student learning. Teacher self-efficacy tends to be stable once it is established; therefore, researchers are interested in how it can be developed in prospective teachers (Tschannen-Moran et al., 1998). Novice teachers who are efficacious are more eager to persist in teaching (Hall, Burley, Villeme, & Brokmeier, 1992). Efficacy beliefs may also increase a teacher's interest in new techniques (Ross, 1998).

This construct came into the scene with the study of RAND Corporation in 1976 which involved two items measuring teacher's impact on student motivation. The items measuring teacher self-efficacy in this study were: "when it comes down to it, a teacher really cannot do much because most of a student's motivation and performance depends on his or her home environment" and "if I try really hard, I can get through to even the most difficult or unmotivated students." This study resulted in significant contribution of teacher efficacy to the reading success of elementary level students (Armor et al., 1976).

Following the research study of RAND Corporation, researchers became more interested in teacher self-efficacy, particularly in K-12 level schools. Among these studies, there were attempts of scale development: Teacher Locus of Control (Rose & Medway, 1981), Webb Efficacy Scale (Ashton et al., 1982), Teacher Efficacy Scale (Gibson & Dembo, 1984), Science Teaching Efficacy Belief Instrument (Riggs & Enochs, 1990), Bandura's Teacher Efficacy Scale (Bandura, 2001), Teachers' Sense of Efficacy Scale (Tschannen-Moran & Woolfolk-Hoy, 2001), and Teachers' Efficacy Beliefs System-Self Form (Dellinger, Bobbett, Oliver, & Everett, 2007).

In addition to scale development studies, teacher self-efficacy was found to be related to several other factors (Tschannen-Moran & Woolfolk-Hoy, 2001). These factors were school-related factors such as health of organizational climate (Hoy & Woolfolk, 1993); teaching related such as planning and organization of teaching (Friedman & Kass, 2002), enthusiasm for teaching (Guskey, 1984), meeting the needs of students (Guskey, 1988); student related such as student

achievement (Ross, 1992), student motivation (Midgley, Feldlaufer, & Eccles, 1989), and student self-efficacy (Anderson, Greene, & Loewen, 1998). A common characteristic of these studies was that they were designed for elementary and secondary schools. There are few research studies on teaching self-efficacy in higher education.

Adapting Tschannen-Moran and Woolfolk-Hoy (2001)'s definition of teacher self-efficacy to college teaching, teaching self-efficacy of faculty members can be defined as their beliefs in their ability to perform teaching at college level. As in elementary and secondary school levels, faculty members who have high level of teaching efficacy are expected to perform teaching better than their colleagues having negative beliefs about their own performance as an instructor (Stajkovic & Luthans, 1998). Additionally, training and experience (Priteo & Altmaier, 1994) and supervision (Prieto, Yamokoski, & Meyers, 2007) were found to be positively correlated with teaching self-efficacy. More importantly, teaching efficacy of faculty has a role in eagerness to improve teaching (Young & Kline, 1996). Using various teaching techniques is positively correlated with teaching self-efficacy of instructors at engineering departments (Colbeck, Cabrera, & Marine, 2002). In most of the studies, teaching efficacy was a component of academic self-efficacy and found to be correlated to different factors such as gender (Brennan, Robinson, & Shaughnessy, 1996) and age, experience, and professional rank (Schoen & Winocour, 1988). According to Brennan and his colleagues (1996), female instructors have high level of teaching efficacy compared to males.

Higher teaching self-efficacy results in increase in teachers' readiness for more difficult targets for themselves and their students and decrease in the occurrence of giving up in case of any obstacle (Ross, Bradley, & Gadalla, 1996). Commitment to teaching and communication with colleagues are also influenced by teaching self-efficacy (Coladarci, 1992). Additionally, being open to innovations and new methods (Guskey, 1988), low level of teacher burnout (Skaalvik & Skaalvik, 2010), more time spent for academic work (Bandura, 1997) are related to high teaching self-efficacy.

Research on sources of teacher self-efficacy with teachers working at K-12 level provides evidence for how self-efficacy of teachers develops. In a study with 255 novice and experienced teachers, Tschannen-Moran and Woolfolk-Hoy (2007) examined two sources of teacher self-efficacy, i.e. enactive mastery experiences and social persuasion. Compared to experienced teachers, teaching self-efficacy of the ones with less teaching experience was found to be influenced more by verbal persuasion. Poulou (2007) studied teaching efficacy and its sources by collecting data from 198 pre-service teachers. He found that physiological and emotional states were the weaker source of teaching self-efficacy among four sources of self-efficacy. In their study with 383 science, mathematics and classroom teachers, Gur, Cakiroglu, and Capa-Aydin (2012) found that teaching self-efficacy of novice teachers, compared to their experienced colleagues, is less influenced by verbal persuasion. In a more recent study, Capa-Aydin, Uzuntiryaki-Kondakci, Temli, and Tarkin (2013) adapted and validated Sources of Self-Efficacy Inventory (SSEI; Henson, 1999). They reported satisfactory

reliability coefficients for four factors of this scale, i.e. mastery experiences, vicarious experiences, social persuasion, and physiological and emotional states.

2.1.2 College teaching self-efficacy

Self-efficacy in teaching has been studied with teachers working at the elementary and secondary school levels, but not that frequently at college level (Burton & Bamberry, 2005; Rogers, Christie, & Wideman, 2014). In studies involving faculty members, self-efficacy related factors which were studied for teachers at secondary education were adapted to college context such as gender, affiliation, and qualifications (Bailey, 1999), academic rank (Balam, 2006), academic discipline (Lindblom-Ylänne, Trigwell, Nevgi, & Ashwin, 2004), pedagogical training (Postareff, Lindblom- Ylänne, & Nevgi, 2008), type of university (Chang, McKeachie, & Lin, 2009), and experience in teaching (Chang, Lin, & Song, 2011; Morris & Usher, 2011).

Bailey (1999) studied teaching self-efficacy and motivation of 225 academic staff to investigate the difference in these constructs with respect to gender, affiliation, and qualifications. He found a low correlation (.14) between self-efficacy in teaching and self-efficacy in research. Results also revealed that neither self-efficacy in teaching nor self-efficacy in research showed difference in terms of gender. However, both self-efficacy scores of tenured faculty were higher compared to their colleagues. An interesting finding of his study was the negative correlation between success in research and motivation for teaching.

That is, faculty members who had low motivation for teaching tend to be successful in research.

In a correlation study, Balam (2006) surveyed 34 faculty members, 9 GTAs, and 968 undergraduate students. Balam (2006) assessed teaching effectiveness by collecting data from both instructors and their students. His comparison resulted in higher ratings for full professors and female faculty members. In terms of teaching self-efficacy, study provided a detailed approach. According to the findings, increase in academic rank resulted in higher self-efficacy in specific teaching tasks, i.e., assessment and classroom management.

With a sample of 340 faculty members from various disciplines including both hard and soft sciences, Lindblom-Ylänne, Trigwell, Nevgi, and Ashwin (2004) conducted a study on approach to teaching, self-efficacy, and teaching context. In this study, self-efficacy was measured in a general point of view rather than focusing on only teaching self-efficacy. However, their research instrument included items measuring teaching self-efficacy as well. Results of this study showed that faculty in hard disciplines tended to have a student-centered approach. Among faculty members from the different disciplines, instructors at faculty of sciences reported higher self-efficacy compared to their colleagues from soft disciplines.

Postareff, Lindblom-Ylänne, and Nevgi (2008) designed a two-year study to examine the effect of pedagogical training on university instructors' teaching self-efficacy and teaching approach. Training course was given on voluntary

basis and sample included 80 faculty members from different disciplines. Results revealed that teaching self-efficacy developed by the influence of pedagogical training but teaching approach remained stable after the training.

In a comparative view, the relationship between teaching self-efficacy and perception of teaching support was studied by Chang, McKeachie, and Lin (2010). They investigated the correlation between these factors for faculty (n = 505) working at public and private universities. According to the study results, teaching self-efficacy had a higher correlation with perceived teaching support in private universities than in public universities.

In a study to investigate the predictors of GTA teaching self-efficacy, DeChenne (2010) developed GTA Teaching Self-Efficacy Scale by modifying College Teaching Self-Efficacy Scale (CTSES; Prieto Navarro, 2005). The original instrument, CTSES, included 44 items on two 6-point scales; assessing how well instructors perform teaching practices (such as course design, planning, and assessing) and how often instructors carry out these practices. DeChenne (2010) removed 17 items on practices, which are not performed by GTAs. Her scale did not include the frequency part and 5-point scale was used in this version. Regarding expert review, she added one item to refer student interaction. DeChenne (2010) validated new version with a 5-point scale ranging from (1) "no confidence" to (5) "complete confidence." by administering it to 177 STEM GTAs. After factor analysis, 10 cross loaded items were omitted and the latest scale with 18 items was reported to have two factors with high reliability coefficients: *learning environment* (α = .90) and *instructional strategies* (α = .85).

Results of her study showed that departmental climate, GTA training, and teaching experience were significant predictors for both teaching self-efficacy.

Distinctively from other studies on teaching self-efficacy, Chang, Lin, and Song, (2011) studied teaching self-efficacy in six dimensions (course design, class management, interpersonal relation, assessment, technology usage, and instructional strategy) by collecting online data from 513 faculty members of 17 universities. Results indicated that faculty members felt efficacious highly in course design, while their self-efficacy was least in setting instructional strategies. Compared to the findings of Lindblom-Ylänne et al. (2004)'s study, Chang et al. (2011) found that members of faculty of education had higher level of teaching self-efficacy. Lastly, faculty members with a year of experience less than six years reported higher levels of teaching self-efficacy. This finding is supported by another study conducted by Morris and Usher (2011) via semi-structured interviews with 12 associate and full professors. Early successful instructional experiences are found to be important for developing high teaching self-efficacy. Furthermore, their teaching self-efficacy is shaped within the first few years as a faculty member (Morris & Usher, 2011). This is an important point to understand the influence of teaching experiences in early years of college teaching especially in terms of development of self-efficacy.

2.2 Instructional Development

The results of needs assessment studies and analysis of existing faculty development programs point out to the need for and focus instructional development. In his need analysis study with 509 faculty members including GTAs, Moeini (2003) found that developing instructional skills was the most emphasized need among personal, professional, and organizational development needs. In a comparative point of view, Cho, Sohoni, and French (2010) conducted a need assessment study through questioning how well GTAs perform in a specific role and how much importance they attribute to that particular task. Results of their study indicated that there was a discrepancy between competence and importance in teaching related tasks, such as communicating with students and motivating them.

2.2.1 Studies with instructors

Scope of studies on instructional development varied and researchers focused on evaluating training, influence of experience on practices in college teaching, and assessment of developmental needs. Postaref, Lindblom-Ylänne, and Nevgi (2008) conducted a study with a sample of 80 instructors on the effect of training on approach to teaching and self-efficacy in teaching. Results showed that while approaches to teaching remained the same after pedagogical training, they reported improvement in the level of teaching self-efficacy. There are other studies proving that experience level of college teachers were found to be a significant factor in determining their instructional approach. An observational

study with 192 faculty members of science departments was conducted by Ebert-May, Derting, Hodder, Momsen, Long, and Jardeleza (2011). They (2011) collected data via survey and videotapes of workshops. Results of their study indicated that the novice instructors tended to implement inquiry-based and learner-centered instruction compared to their experienced colleagues after completing the workshop series. This finding is consistent with Gibbs and Coffey (2004)'s conclusion that development programs in college teaching in early years of career make instructors inclined to try different methods and learner-based techniques in teaching.

In Houston and his colleagues' study (2004) based on 443 instructors' evaluation of development needs, most of the participants chose time management, evaluating student performance, and providing feedback as the instructional issues where they needed training. Additionally, development needs of faculty tend to change with respect to different levels of experience. Opre and his colleagues (2008) conducted a need assessment survey with 570 instructors from four universities. Their study revealed that interest of early career instructors lay on development of teaching skills, whereas tenured faculty's focus is on improving research skills. Smith and Hardinger (2012)'s study on development needs at a faculty of pharmacy (n = 34) resulted in a need for training which focuses on teaching tasks, e.g., classroom management and course planning.

2.2.2 Studies with teaching assistants

Since the responsibilities of GTAs and their effect on learning keep increasing, their instructional development becomes important not only for their contribution to student learning and engagement, but also for becoming qualified scholars. GTAs are expected to have pedagogical content knowledge and teaching skills to perform teaching in higher education (Hardré, 2005). Most of the GTAs are not ready for their teaching role (Hardré & Burris, 2012), yet they are aware of the developmental need. Survey study of Meyers, Reid, and Quina (1998) with doctoral students (n = 89) at three research universities resulted in that many graduate students of psychology considered themselves unprepared for their career in academia, due to receiving little or no information about faculty roles and classroom management. When GTAs are not sufficiently prepared for their roles as instructors through training or teaching experiences, they are more likely to experience frustration and failure (Cho, Sohoni, & French, 2010). In a study on student evaluation (n = 538) of effectiveness of GTAs (n = 14) in chemistry laboratory courses, Herrington and Nakhleh (2003) examined student rankings of GTA characteristics. Their findings showed that undergraduate students considered GTA knowledge and skills as important rather than their attitudes toward students. That is, GTA approach to students such as being friendly, enthusiastic, or concerned was rated as less important than their teaching skills such as having extensive knowledge of the subject or the ability to explain concepts and procedures to students. Furthermore, O'Neal, Wright, Cook, Perorazio, and Purkiss (2007) conducted a survey study with undergraduate students (n = 2669) from science departments and found that

GTA teaching approach, such as fostering a positive laboratory environment, has an influence on student retention in science.

Similarly, French and Russell (2002) performing a study with 35 GTAs who were teaching in inquiry-based biology laboratory reported that novice GTAs regarded their teaching role as delivering information to students and GTAs concentrated mostly on classroom management. Contrary to novice GTAs, experienced assistants perceived their teaching role as a facilitator of learning. In another study conducted by Gallego (2014) with 32 GTAs, classroom management was found to be the common theme in GTA journals. The results of this three year study on GTAs' reflections indicated that GTAs concerned more about disciplining the class, frustration with students, grading, and time management. In line with these results, Meyers and Prieto (2000) emphasized the need for further research utilizing faculty observations, evaluations of undergraduates, pre-post tests administered before and after GTA training, and assessment of GTA behavior in various teaching contexts.

In an evaluation study (n = 71) on effectiveness of training and supervision, Prieto and Scheel (2008) found that developmental programs to train especially psychology graduate students as instructors depend mostly on the courses on teaching of psychology, supervising teaching practice, mentorship, and peer support. Science, technology, engineering, and mathematics (STEM) departments also provide such courses in the scope of faculty development program especially designed for GTAs. DeFranco and McGivney-Burelle (2001) studied change in the beliefs of teaching assistants (n = 22) working at

mathematics department after taking mathematics pedagogy course. This course was evaluated by GTAs as effective in understanding the goal of teaching. Course also changed GTA perception of teaching from knowledge transfer to promoting an understanding of the instructional material.

2.3 Departmental Teaching Support

Departmental teaching support refers to how department share the meaning and understanding in their college teaching experience with colleagues. This support is one of the components of departmental teaching climate. *Climate* is defined as the work environment in which manager, peers, and policies are perceived by the individual in Dubin's (1990) terms. With an organizational point of view, Schneider (1992) defines climate as the feeling that is developed through the interaction of both among the members of an organization and others who receive services from the organization. Austin (1996) pointed out that teaching and research related values and norms of a department can be raised by the contribution of each department member. Departmental climate, in general, refers to the atmosphere built as a result of the relationship among the members of a department including administrators, instructors, supervisors, and GTAs. Climate in a department is a combination of codes of communication, sets of values, and different attitudes (Austin, 1996).

More specifically, *departmental teaching climate* refers to the teaching culture at a department. According to Hill (1986) teaching climate has a significant influence on the commitment to the profession and job satisfaction (as cited in Lacy &

Sheenan, 1997). One of the purposes of faculty development programs is to foster the teaching culture across department and faculty. There are various ways to develop a teaching culture in a department or faculty such as instructional development activities like workshops and seminars, support of tenured faculty via instructional support services, and faculty meetings on teaching practices. Researchers agree on that an environment where teaching experiences are shared increases the opportunities for instructors to develop their own teaching skills. Froh, Menges, and Walker (1993) interviewed 86 faculty members at 6 research universities and they concluded that instructors consider experience sharing as an intrinsic motivation for teaching. LaCelle-Peterson and Finkelstein (1993) also characterized positive teaching culture by interaction regarding teaching practices and collaboration for new teaching activities. The reason behind this influence is that immediate feedback can be provided through experience sharing and this leads to an increase in teaching motivation (Feldman & Paulsen, 1999).

Discipline and departmental environment have an influence on teaching approaches of instructors by which is related to the conception of teaching (Postareff & Lindblom-Ylänne, 2008). In a survey study (n = 443), Singer (1996) found that teaching approach of an instructor is influenced by teaching approach of other faculty members. Among these members, the instructor whom a GTA works more frequently with, which can be considered as a mentor, contributes teaching climate more than others (Bomotti, 1994; Commander, Hart, & Singer, 2000; Smith, 1993). GTAs have a tendency to teach in similar ways as the instructors whom they admire (Boehrer & Sarkisian, 1985). LaCelle-Peterson

and Finkelstein (1993) reported that a positive teaching climate is created by increasing the opportunities for collaborative and cooperative teaching activities for faculty development.

Departmental environment has both physical and psychological components. It refers to the place where GTAs teach undergraduates, interact with senior instructors, and develop values and attitudes towards their profession (Notarianni-Girard, 1999). In a study on GTA (n = 32) teaching effectiveness, Lumsden (1989) reported that GTAs attribute value to effective teaching when they think that their department values it. Regarding departmental support, support for new ideas, resources for teaching, and training were found as meaningful by GTAs to improve their teaching skills. The kind of messages other instructors convey regarding their teaching role is also critical for GTAs since they consider other faculty members as role models (Gray, Froh, & Diamond, 1992). Smith (2001) also proposes that faculty must recognize teaching roles and indicate its necessity to contribute GTAs development as a professional instructor. Another researcher, who studied the influence of departmental climate with GTA was DeChenne (2010) and she, in a correlational study with 177 STEM GTAs, examined the relationship between teaching self-efficacy and GTA perception of teaching training, departmental climate, and teaching experience. Her findings indicated that GTA perception of teaching training, departmental climate, and teaching experience significantly predicted GTA teaching self-efficacy.

2.4 Teaching Experience

Development of teaching self-efficacy is prone to change in first years of teaching profession (Woolfolk-Hoy & Burke-Spero, 2005); therefore, teaching experience in these years are very effective in development of teaching self-efficacy (Mulholland & Wallace, 2001). Experience, academically, represents the living and performances within an institution and teaching experiences are the ones specifically gained through performing teaching. Experiences that are satisfying and collaborative can result in willingness to continue in academic life according to Tinto (1987). GTAs consider previous teaching experiences as a training process for learning self-expression and public speaking (Schaeffer, McGill, & Menges, 1989). In their study with GTAs from various disciplines, Shannon, Twale, and Moore (1998) investigated that teaching effectiveness significantly increases when GTAs have previous teaching experiences.

Moreover, teaching experience of GTAs was found as a correlate of self-efficacy in teaching for psychology GTAs (Prieto & Meyers, 1999; Tollerud, 1990). Research has shown that more teaching experience results in change in teacher decision-making, pedagogical knowledge, problem solving approach, and classroom management style (Palmer, Stough, Burdenski, & Gonzales, 2005).

DeChenne (2010) examined teaching experience in a correlational study on the factors predicting GTA teaching self-efficacy. In her study, years in K-12 teaching experience and the amount of time spent in college teaching were combined into the variable of teaching experience. Influence of teaching

experience, GTA training, and departmental climate on GTA teaching self-efficacy was investigated by performing path analysis and DeChenne (2010) reported these factors as significant predictors of GTA teaching self-efficacy.

2.5 Value Attributed to College Teaching

The term "value" has its basis in Expectancy Value Model, developed by Eccles et al. (1983). Value refers to the attractiveness of success gained from a performance according to Atkinson (1957). In Expectancy-Value Model (Eccles & Wigfield, 2002), persistence, performance, and choice are specified to be influenced by *expectancies* and *values* and these two factors are affected by goals and task-specific beliefs like self-efficacy. Eccles and Wigfield (2002) proposed three more factors to classify these constructs in expectancy-value theory: (i) expectancy/ ability beliefs, (ii) subjective task value (attainment, intrinsic, and utility values), and (iii) perceived task difficulty. Among these, *expectancies* are related to beliefs on how an individual will perform. The other component of the model, *subjective task-value*, was defined as how a task meets different needs of individuals (Eccles & Wigfield, 2002). This component was defined to be composed of the following values: Attainment value (importance of performing well on a task), intrinsic value (enjoyment one gets from the task), utility value (the degree of a task being related to goals), and cost (amount of negative aspects of performing a task) (Eccles et al., 1983). The value attributed to a task is important and defined differently with respect to how an individual evaluates the benefit and cost of the task. That is, finding a task interesting or enjoyable

refers to *intrinsic value*; subjective importance of achievement in that task relates to *attainment value;* and gain from task engagement is the issue of *utility value.*

According to Eccles et al. (1983), emphasize in values, especially in intrinsic and attainment values, is how much an individual is satisfied being involved in a specific task and how much importance is attributed to being good at a special action. Needs and values of an individual and characteristics of a task are determinants of the value of a task. Individual's engagement in a specific task is influenced by whether that task meets his/her needs, helps to reach goals or whether the individual gets meaning for personal values from engaging in that task (Eccles et al., 1983). Both expectancies and values related to career choices (Eccles, Barber, & Jozefowicz, 1998). There is a direct relation between value attached to the task and educational, vocational and other achievement related choices, ability beliefs, and achievement expectation (Eccles et al., 1983; Wigfield & Eccles, 2000). Furthermore, task-specific beliefs like self-efficacy beliefs are assumed to affect values in Expectancy-Value Model. Depending on this model, conceptualization of attainment value is as follows (Eccles & Wigfield, 2002; p. 114):

> the personal importance of doing well on the task is related to the relevance of engaging in a task for confirming or disconfirming salient aspects of one's self-schema (i.e. because tasks provide the opportunity to demonstrate aspects of one's actual or ideal self-schema, such as masculinity, femininity, and/or competence in various domains, tasks will have higher attainment value to the extent that they allow the individual to confirm salient aspects of these self-schemata.)

This conceptualization defines *attainment value* as the degree of a task being self-relevant and subjective importance in performing the task. Attainment value refers to the level that a task provides the opportunity to confirm or disconfirm salient aspects of one's self-conception. People tend to perform positively valued tasks while they avoid performing negatively valued ones (Eccles et al., 1983).

The extent to which a specific goal is associated with the willingness to invest effort in attaining it defines goal commitment (Brunstein, 1993; Hollenbeck & Klein, 1987). Commitment is an indicator of the importance attributed to that specific goal. Goal importance refers to the perception of the attainment value attached to a goal (Eccles & Wigfield, 2002). According to Lee, Carswell, and Allen (2000), commitment to an occupation refers to affective reaction and it is a psychological link that determines how an individual feels about his/her work.

According to Firestone and Pennell (1993), teachers who are affiliated to their students, schools and what they teach are the ones who are committed their profession Reyes (1990) characterizes committed teachers as professionals who allocate more time to daily preparation for the course and extracurricular activities, be active in decisions for school, and develop belongingness to the school. Teacher commitment is therefore important for school, students, and teacher.

In a more recent study on career satisfaction and commitment to teach, factors influencing choosing teaching as a career were examined by Watt and

Richardson (2007). They developed and validated a scale (Factors Influencing Teaching -FIT- Choice Scale) measuring motivational factors affecting teaching as a career choice. The model on which the scale based highlights the altruistic type of motivations that have been focused in the literature and represents psychological factors which affect the choice of teaching as a career (Watt, Richardson, Klusmann, Kunter, Bayer, Trautwein, & Baumert, 2012). FIT-Choice Scale is also founded on intrinsic motivations, personally utilitarian motivations, and ability-related beliefs such as self-efficacy beliefs. It assesses career satisfaction and commitment to teach (Watt et al., 2012). Watt and Richardson (2007) provided valid and reliable results for FIT-Choice Scale. According to their findings, positive prior teaching and learning motivations were found to be positively correlated with planned persistence in teaching profession; whereas job security, transferability, and time for family (as personal utility values) were negatively correlated with planned persistence in teaching profession and career choice satisfaction.

2.6 Summary

Instructional development of GTAs becomes important both for their contribution to student learning and engagement, and also for becoming qualified scholars regarding increase in their teaching responsibilities and their effect on learning. GTAs' perceptions about their performance as instructor, teaching approaches, and beliefs gain importance with this increasing need. Among these factors, teaching self-efficacy belief, or feeling competent in teaching related tasks, directly relates to teacher commitment (Coladarci, 1992),

willing to make innovations in teaching, and implementation of new methods (Guskey, 1988), and teacher burnout (Skaalvik & Skaalvik, 2010). Most of the theoretical background on teaching self-efficacy comes from studies on self-efficacy of teachers working at K-12 level. However, there are a few researchers focused on GTA teaching self-efficacy. For example, Prieto et al. (2007) found a significant change in GTA teaching self-efficacy regarding teaching role (i.e., grader, lab assistant). Burton et al. (2005) reported a non significant relationship between teaching experience and GTA teaching self-efficacy. Contrarily, Prieto and Altmaier (1994) found a positive relationship between GTA teaching self-efficacy and experience. Inconsistent results of these studies emphasize the need for new studies to enrich the literature on teaching self-efficacy and its' predictors, particularly at college level.

In summary, this study was designed to test a statistical model examining the relationship among GTA teaching self-efficacy, their teaching experience, mastery experience, value they attribute to college teaching, their instructor's teaching support, departmental teaching support, and number of courses they assisted. Prior to the current study, DeChenne (2010) studied college teaching self-efficacy within a statistical model in the GTA context. She examined GTA perception of training on teaching, departmental climate, teaching experience, and GTA teaching self-efficacy. In DeChenne's study, departmental climate includes relationships with supervisor and peers. Additionally, training on teaching is a focus of her study since there is a formal training for GTAs. In the current study, teaching approach and support of instructor who is a role model or whom GTA work with closely is examined rather than the relationship with

supervisor. The reason behind including instructor instead of supervisor is that supervisor is not always expected to be a role model for GTA in teaching. Compared to DeChenne's model, training on teaching was not included in the model of the current study. Mastery experience and value attributed to college teaching were also tested in the model as direct and indirect predictors of GTA teaching self-efficacy. GTA Teaching Self-Efficacy Scale (DeChenne, 2010) is adapted in Turkish and validated to measure teaching self-efficacy of STEM GTAs. Besides, the current study is an attempt to extend the reviewed literature in two ways. First, it is aimed to provide empirical data on GTA teaching self-efficacy and associating factors, because self-efficacy in early years of teaching has a tendency to be stable in subsequent years of teaching in higher education. If positive self-efficacy is developed in the early years of teaching experience, positive attitudes toward teaching can be evolved (Woolfolk-Hoy & Burke-Spero, 2005). Second, this study will yield results of model testing investigating the relationship among GTA teaching self-efficacy, their teaching experience, mastery experience, value they attribute to college teaching, their instructor's teaching support, departmental teaching support, and number of courses they assisted. These results are expected to satisfy the need for a precise examination of associated factors of teaching self-efficacy.

CHAPTER III

METHOD

3.1 Research Design

The present study utilized an associational research design. In associational research design, the purpose is to identify relationships between two or more variables and there are two types of this design: (i) correlational research and (ii) causal-comparative research (Fraenkel, Wallen & Hyun, 2012). In both correlational and causal-comparative research, there is no manipulation or intervention designed by the researcher. However, causal-comparative research differs from correlational research in terms of investigating the consequences of differences between study groups. Correlational research aims to determine any possible pattern of change in variables. In the current study, the aim was to explore the relationship among GTA teaching self-efficacy, value GTAs attribute to teaching, their instructor's teaching support, departmental teaching support, mastery experience, number of courses they assisted, and teaching experiences. The hypothesized model was tested through a structural equation modeling. Therefore, this study has a correlational nature.

3.2 Research Question

This study addressed the following research question:

What is the best model explaining the relationship between GTA teaching self-efficacy, departmental teaching support, teaching experience, mastery experiences, number of courses GTAs assisted, instructor's teaching support, and value they attribute to college teaching?

3.3 Description of Variables

The following are the definitions of variables investigated in this study through a structural model:

GTA teaching self-efficacy is GTAs' self-efficacy in college teaching, which is the main construct in this study, can be defined as teaching assistants' beliefs in how well they can perform teaching related activities such as applying different teaching techniques, administering assessment procedures, and communicating with their students in the university setting. GTA teaching self-efficacy refers to belief in ability to perform current teaching responsibilities as a teaching assistant.

Value attributed to college teaching corresponds to the importance that graduate teaching assistants attribute to the teaching tasks they accomplish at college level.

Mastery experience refers to the acts of an individual in a particular task. Mastery experience is the most effective source of self-efficacy (Bandura, Adams, & Beyer, 1977). High score in this scale refers to having positive beliefs in experiencing teaching at higher education.

GTA teaching experience refers to the frequency of performing different teaching practices such as motivating students, grading, developing exams, and communicating with students. High score in this variable is the indicator of executing various instructional practices as a graduate teaching assistant.

Instructor's teaching support assesses GTA's evaluation of his or her instructor's support for teaching. For this scale, instructor refers to instructor who is a role model for the graduate teaching assistant or instructor whom graduate teaching assistants closely study with at the department. GTA can consider his or her advisor, his or her favorite instructor or any other closely worked instructor to evaluate. High score in this scale indicates that the instructor whom the participant GTA works closely provides the GTA necessary feedback, sources, and help to execute teaching.

Teaching approach of instructor assesses GTA's evaluation of his or her instructor's teaching approach. For this scale, instructor, similarly with the previous variable, refers to instructor who is a role model for the graduate teaching assistant or instructor whom graduate teaching assistants closely study with at the

department. Participants' high rating in this scale implies positive evaluation of instructor's teaching approach.

Departmental teaching support is the support that GTAs receive from academic staff in the department for teaching approaches and sources related to teaching ideas and experiences. High score is the indicator of sufficient perceived support for teaching provided by the department.

Number of courses assisted refers to the number of different courses being assisted by GTAs.

3.4 Context of the Study

The state universities in Turkey which are among the top ten in the University Ranking by Academic Performance 2013 list were the focus of this study. Only one of them offers a course on teaching for science, technology, engineering, and mathematics (STEM) GTAs and it is a must course for them, who are in the Faculty Development Program.

In the current study, staff positions of the participants were categorized as contracted and permanent. Researchers considered the regulations on faculty development with respect to Law of Higher Education numbered 2547. GTAs who are subjected to Article 35 and Faculty Development Program are classified as *permanent staff*, whereas *contracted staff* refers to GTAs who are subjected to Article 50d. According to the law (Law of Higher Education, numbered 2547):

> "GTAs may be assigned temporarily to another university in order to be trained as teaching staff or to make research or doctoral studies by Higher Education Council. In this way, the ones who have doctoral degree or medical specialty or qualification in art, return to their home university at the end of this education with their position (Article 35). After studying at the undergraduate level, the ones who would like to have a graduate degree from higher education institutions or doctorate degree or those who want to be specialized in medicine are selected according to the examination which the higher education institutions will be administered and the principles to be determined by Inter University Council. Graduate students, as they can benefit from the scholarships assigned, can be assigned to one of the positions, including teaching assistantship for a year for once (Article 50d). Additionally, within the scope of Faculty Development Program (OYP), graduate institutions of higher education which have graduate education programs train GTAs of other higher education institutions which are in need of instructors."

3.5 Participants

Data were collected from four state universities in Ankara, which were among the top ten in the University Ranking by Academic Performance 2013 list. Participants included GTAs who were working at STEM departments of these universities. The target population was composed of GTAs working at STEM departments of state universities in Ankara.

Participants were GTAs from only science, technology, engineering, and mathematics (STEM) departments, because these departments have a similar disciplinary approach; i.e., they are all classified as natural sciences. The reasons for including STEM GTAs vary due to the characteristics of these departments.

Firstly, the amount of time allocated to teaching is different for each academic discipline (Roskens & Creswell, 1981) and teaching concerns of teaching assistants differ depending on their department (Luo, Bellows, & Grady, 2000). Secondly, heavy teaching loads are assigned to GTAs in STEM departments. Due to STEM GTAs' roles, these assistants face different obstacles than those of GTAs studying in other disciplines (Lindblom-Ylanne, Trigwell, Nevgi, & Ashwin, 2006). In addition to their regular roles as graders, they have additional duties such as teaching at lab and recitation sections (DeChenne, Enochs, & Needham, 2012). Other departments or social science based departments or faculties such as faculty of arts or faculty of education have different teaching practices. This study has no purpose of comparing faculties or scientific approaches. Therefore, GTAs working at social science departments were not asked to participate to the study.

The number of graduate assistants working at STEM departments of four state universities was 980. Of the 980 GTAs whom the online questionnaire was sent, 160 GTAs responded with a response rate of 16.33%. To increase the response rate, GTAs were visited at their offices and asked to complete the questionnaire. Additional 142 questionnaires were collected. Data collection ended with a sample of 302 participants. Total response rate increased to 30.82%. Characteristics of the participants are displayed in Table 3.1. Of 302 participants, about half of them (52.65%) were female. The majority of the participants (68.87%) were pursuing a Ph.D. degree, while 24.5% of the participants were master students and only 16 of all GTAs in this study were in the integrated PhD program. Nearly half of the participants (54.97%) were working as a

contracted staff, whereas 43.38% of them had a position as permanent staff. Most of the participants (69.53%) reported that they had no training on teaching, while 83 of them took a course on teaching. Finally, participants' year of experience as GTA was asked as starting date and calculated into years. Out of 302 participants, 50 of them reported their year of experience is less than one year. Maximum year of experience was found as 10.

Table 3.1
Characteristics of the Sample

Variables	*f*	%
Gender		
Female	159	52.65
Male	142	47.02
Degree		
MS	74	24.50
PhD	208	68.87
Integrated PhD	16	5.30
Department		
Biology	10	3.31
Chemistry	17	5.63
Mathematics	28	9.27
Physics	5	1.66
Statistics	14	4.64
Actuarial Sciences	1	.33
Aerospace Engineering	1	.33
Astronomy and Space Sciences	8	2.65
Bioengineering	1	.33
Chemical Engineering	6	1.99
Civil Engineering	24	7.95
Computer Engineering	12	3.97
Environmental Engineering	20	6.62
Electronic Engineering	9	2.98
Food Engineering	43	14.24
Geodesy Engineering	15	4.97
Geology Engineering	9	2.98
Geomatic Engineering	1	.33
Geophysics Engineering	12	3.97
Industrial Engineering	21	6.95
Mechanical Engineering	5	1.66
Metallurgy Engineering	8	2.65
Mining Engineering	11	3.64
Petroleum and Natural Gas Engineering	1	.33
Physics Engineering	18	5.96
Position		
Permanent Staff	131	43.38
Contracted Staff	166	54.97

3.5.1 Teaching practices of the participants

Teaching practices of participants was measured via asking questions on participation to activities on teaching and their prior teaching role since they have started working as a graduate teaching assistant. Out of 5 point scale, participants scored negatively most of the items (on attending and participating workshops, seminars, conferences which are organized to teaching in science, engineering, mathematics, and technology fields). However, they preferred to discuss teaching with their peers (M = 3.14, SD = 1.10). Descriptive statistics for items on participation to activities on teaching are displayed in Table 3.2.

Table 3.2
Participation to Activities on Teaching

	M	*SD*
How frequently have you performed following activities since you have started working as a GTA:		
1. Attended a departmental workshop/ seminar on teaching as a participant	2.16	1.15
2. Presented at a departmental workshop/ seminar on teaching	1.37	.69
3. Attended a symposium/ conference on teaching in my field as a participant	2.20	1.20
4. Presented at a symposium/ conference on teaching in my field	1.68	.99
5. Attended a conference on teaching in my field (sponsored by disciplinary association) as a participant	1.51	.83
6. Presented at a conference on teaching in my field (sponsored by disciplinary association) as a participant	1.20	.56
7. Discussed teaching with colleagues	3.14	1.10

It is not surprising that most of the participants (57.3%) defined their prior teaching role as lab assistant. Out of 302 participants, only 28 of them (9.3%) reported their prior responsibility as grading assignments and exams. Distribution of teaching roles is shown in Table 3.3.

Table 3.3
Prior Teaching Role

	f	%
Lab assistant	173	57.3
Recitation assistant	46	15.2
Grading	28	9.3
Instructor	48	15.9

Note. N = 302. There are 6 (2%) missing values.

3.6 Data Collection Instrument

Research instrument, called *GTA Survey Instrument*, included seven sections in which GTAs' demographic information and teaching profile, mastery experience, value attributed to college teaching, teaching self-efficacy, teaching experience, instructor's teaching support, and departmental teaching support were measured in a quantitative manner. Each section is explained in detail:

The first section had two major parts: The first part consisted of twelve items about demographic information: gender, university of employment, degree of graduate education, term of graduate education, department of employment, duration of employment, position of employment, number of semesters GTA

assisted a course, the number of different courses GTA assisted, and the scope of primary instructional duty (i.e., lab assistant, recitation assistant, grader, or instructor).. The second part included a scale with 7 items assessing the frequency of participating activities improving teaching such as conferences and departmental seminars on teaching STEM disciplines. This scale was adapted from the instrument used in Faculty Survey on Teaching, Learning and Assessment (FSTLA), which was conducted by Dey and Hurtado (2000) in scope of the research study on Academic Programs and Students for the National Center for Postsecondary Improvement (NCPI) at Stanford University.

The second section included 18-item *GTA Teaching Self-Efficacy Scale*, which was developed by DeChenne (2010). The scale was developed by modifying College Teaching Self-Efficacy Scale (CTSES; Prieto Navarro, 2005). CTSES was an instrument with 44 items on two 6-point scales; assessing both how well instructors perform teaching practices (such as course design, planning, and assessing) and how often they carry out these practices. DeChenne (2010) removed the frequency part and changed 6-point scale to 5-point due to limitations in data collection. In addition, she removed 17 items referring to the practices, which are performed by the instructor not by the GTA. Following items were among the removed ones due to being unappropriate for GTA context: "employ systematic methods that permit me to assess my own teaching," "modify and adapt my syllabus if my students' needs require it," "develop my teaching skills using various means (attending conferences, reading about pedagogy, talking to other professionals)," "decide on the most appropriate evaluation method for a particular course." DeChenne (2010) rewrote four items

to make the scale more specific to graduate teaching assistants. After a content review by experts as an evidence for face validity, one item referring to student interaction was added. DeChenne (2010) called the final scale as "GTA-Teaching Self-Efficacy Scale" (GTA-TSES), including 28 items with a 5-point scale ranging from (1) "no confidence" to (5) "complete confidence." Lastly, Dechenne (2010) validated this instrument by administering it to 177 STEM GTAs. Factor analysis revealed two factors explaining 46% of the variance and resulted in 10 cross-loaded items. After omitting these 10 items, the latest scale was reported to have 18 items with a 5-point scale and high reliability coefficients for both factors: *learning environment* (α = .90) and *instructional strategies* (α = .85). The *learning environment* factor included items like: "create a positive classroom climate for learning," "encourage the students to interact with each other," and "promote student participation in my classes." The second factor, *instructional strategies,* contained items such as "prepare teaching materials I will use," "stay current in my knowledge of the subject I am teaching," and "evaluate accurately my students' academic capabilities." The adaptation process (Section 3.5.1) of this scale is reported in the next section.

The third section included a scale measuring the value teaching assistants attribute to college teaching. The *Value Attributed to College Teaching Scale* was developed by the researchers for the purpose of the current study. Items were generated considering the two components of task value, i.e., intrinsic and attainment value, defined by Eccles et al. (1983). The final scale included 9 items on a 5-point Likert scale (ranging from *strongly disagree* [1] to *strongly agree* [5]). The sample items are "it is important for me to establish effective

communication with students," "it is important for me to stay current in subjects I teach," and "I care about providing feedback on students' performance."

The fourth section included the items of Mastery Experience dimension of Sources of Self-Efficacy Inventory (SSEI; Henson, 1999). The aim of using these items was to understand how GTAs interpret their teaching experiences. The SSEI was adapted by Capa-Aydin, Uzuntiryaki-Kondakci, Temli, and Tarkin (2013). It contains 27 items with a rating scale ranging from 1 (definitely not true) to 7 (definitely true). Capa-Aydin et al. (2013) confirmed the four-factor structure with the following Cronbach's α coefficients: *Mastery experiences* (α = .75), *vicarious experiences* (α = .78), *social persuasion* (α = .76), and *physiological and emotional states* (α = .75). For the present study, only one item was modified in order to make it appropriate for teaching assistants. More specifically, the original item was "I have developed many of my teaching skills by actually teaching" and revised version was "I acquired many of my teaching skills by experiencing in real teaching environments."

Similarly, the last three sections (assessing frequency of teaching practices, departmental support, and instructor's support) were developed based on DeChenne (2010)'s GTA data collection instrument. The GTA *Teaching Experience Scale* assessed the frequency of the instructional practices (e.g. grading, dealing with problematic students, implementing different instructional methods, facilitating group discussions, and communicating with students) teaching assistants performed. Originally, DeChenne (2010) developed

15 items on a 5-point scale ranging from never (1) to always (5). Four items included in the original scale were omitted because they contained pedagogical terms (e.g., teaching styles, learning styles).

The original measure of departmental teaching climate (DeChenne, 2010) included 18 items measured on a 5-point scale ranging from 1 (rarely occurs) to 5 (frequently occurs). It was developed by modifying selected items of the Organizational Climate Index (Hoy, Smith, & Sweetland, 2002) and Teaching Assistant Training Inventory (Notarianni-Girard, 1998). It consisted of three dimensions, namely "supervisor teaching relationship" (Cronbach's α = .88), "peer teaching relationship" (Cronbach's α = .83), and "facilitating GTA training" (Cronbach's α = .66). In the current study, "facilitating GTA training" dimension was omitted because there is no formal training for graduate teaching assistants. In addition to 18 items of Departmental Teaching Climate Scale, five items from the "Mentor Support Scale" (Capa & Loadman, 2004) were added by altering the word "mentor" with "instructor." Furthermore, two items ("the instructor shares teaching experiences with me" and "the instructor shares teaching resources with me") were developed to be included in the "Instructor Support Scale." The final *Instructor's Support Scale* included 13 items assessing both teaching approach and support level of instructor whom the teaching assistant work with closely or take as a role model. The final *Departmental Support Scale* included 10 items assessing the departmental support provided for all teaching assistants working in the department. The adaptation procedure is presented in the next section.

The sample items and the rating scale of the final form of *GTA Survey Instrument* are presented in Table 3.4.

Table 3.4
The GTA Survey Instrument

Survey section	Sample Items	Rating scale
Mastery Experience Scale	Item2. I have had many positive opportunities to teach. Item3. I have learned a great deal from teaching in classrooms. Item8. I acquired many of my teaching skills by experiencing in real teaching environments.	5-point
Value Attributed to College Teaching Scale	Item1. It is important for me to stay current in subjects I teach. Item4. It is important for me to establish effective communication with students. Item8. I care about providing feedback on students' performance.	5-point
GTA Teaching Self-Efficacy Scale	*How confident am I in…* Item2. Creating a positive classroom climate for learning. Item9. Encouraging the students to interact with each other. Item14. Preparing teaching materials I will use.	Likert (5-point)
GTA Teaching Experience Scale	Item1. Grading assignments and exams Item3. Motivating students Item9. Facilitating group discussion	5-point

Table 3.4 *(continued)*

Survey section	Sample Items	Rating scale
Instructor's Support Scale	*Instructor who is a role model for me or whom I work with more;* Item4. Provides his student timely and detailed feedback. Item9. Encourages me to apply my decisions in classroom. Item10. Brainstorms with me to help develop lesson plans.	Likert (5-point)
Departmental Support Scale	*In my department…* Item 2. Sufficient resources are provided GTAs to be successful in carrying out their job. Item4. Instructors shares innovation on teaching with GTAs. Item6. GTAs are encouraged to experiment with newly learned teaching methods.	Likert (5-point)

3.6.1 Adaptation of GTA Teaching Self-Efficacy Scale

To adapt GTA Teaching Self-Efficacy Scale, permission was obtained via e-mail (see appendices) from the developer, Sue Ellen DeChenne who is a faculty member at University of Nebraska-Lincoln. GTA Teaching Self-Efficacy Scale is the adapted version of College Teaching Self-Efficacy Scale (CTSES; Prieto Navarro, 2005) for teaching assistants (DeChenne, 2010). GTA Teaching Self-Efficacy Scale was measuring how well college teachers perform instructional practices such as course design, planning, and measurement and evaluation through 18 items with a 5-point scale from 1 (no confidence) to 5 (complete confidence). In the adaptation procedure, translation of GTA Teaching Self-Efficacy Scale was performed with respect to the basic steps recommended in

the "Guidelines for the Process of Cross-Cultural Adaptation of Self-Report Measures" (Beaton, Bombardier, Guillemin, & Ferraz, 2010). These steps include initial translation, review of the translations, back translation, consensus on translated versions, and test of prefinal version. For initial translation, three experts, who were foreign language teachers, translated the original 18-item scale from English to Turkish. The next step was review of the three translated versions by the researchers. At this step, discrepancies were solved by asking the experts' explanation for the reasoning behind their word choice. In the third step, obtained Turkish version was sent to two foreign language teachers and a translator. These experts were blind to the original version so that they could translate the Turkish version into the original language independently. To have a consensus on back translated version, researchers compared the back translated version with the original one. With this step, researchers reached a semantic equivalence between the back translated version and the original one.

3.6.2 Cognitive interview of the GTA survey instrument

Cognitive interviews were conducted with four teaching assistants from STEM departments (two from Industrial Design, one from Computer Engineering, and one from Electrical and Electronics Engineering) of two universities (one public and one private) in Ankara. Interviewees had 4 – 6 years of teaching experience. They evaluated the items in terms of content and appropriateness for graduate teaching assistants and university context. With respect to the comments obtained through cognitive interviews, some items were revised in terms of grammatical structure and some were made more descriptive by adding

examples. For example, *lecture, problem solving*, and *group work* were added in parenthesis as an example of "teaching techniques" for one of the items of Instructor's Support Scale. Additionally, two items were eliminated from Departmental Support Scale due to being problematic for content integrity. One of these items was: "there is a platform (e.g., meetings or online forums) in which instructors share their teaching experiences." This item has an emphasis on sharing experiences; however, GTAs stated that they do not know how much instructors share their experiences in this way. In other words, GTAs reported that they are not a part of this process. Another omitted item was "instructors give priority to teaching tasks besides research" from the Instructor's Support Scale. The interviewees reported that this item is different from the rest of the items in the scale as the scale assesses teaching approaches of instructors in the department and their support in teaching activities.

3.6.3 Pilot study

Research instrument was piloted with 101 GTAs who work at STEM departments of a state university in Ankara. The pilot study took two weeks and data were collected from the participants at their offices. Graduate assistants were asked to give information about their gender, department they employed, their graduate level, position, duration of employment, and semester they currently enroll. Characteristics of the participants related to above mentioned variables are presented in Table 3.5.

Table 3.5
Demographic Information for Pilot Data

Variables	*f (%)*	*M (SD)*
Gender		
Female	41 (40.6)	
Male	60 (59.4)	
Duration of employment(month)		33.05 (25.74)
Semesters in the program		4.87 (2.66)
Department of employment		
Aerospace engineering	8 (7.9)	
Civil engineering	29 (19.8)	
Computer engineering	12 (11.9)	
Food engineering	11 (10.9)	
Metallurgy engineering	13 (12.9)	
Mining engineering	11 (10.9)	
Physics	14 (13.9)	
Statistics	12 (11.9)	
Graduate Level		
Master	45 (44.6)	
Variables	*f (%)*	*M (SD)*
PhD	50 (49.5)	
Integrated PhD	6 (5.9)	
Position		
Permanent staff	26 (25.8)	
Contracted staff	74 (73.3)	

Note. Departments included in pilot data collection were omitted in the main study.

For GTA Teaching Self-Efficacy Scale, Confirmatory Factor Analysis (CFA) was performed by using AMOS 18.0 software (Arbuckle & Wothke, 1999). Chi-square value, comparative fit index (CFI), non-normed fit index (NNFI; aka Tucker Lewis index, TLI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR) were examined and reported to indicate model fit. CFI and NNFI values higher than .95 indicate good fitting model (Hu & Bentler, 1999). RMSEA value smaller than .05 is

considered as an indicator of close fit. Values between .05 and .08 are indicative of fair fit, whereas values between .08 and 1.00 indicate mediocre fit (Kaplan, 2009). Additionally, values of SRMR less than .10 are indicators of acceptable fit (Kline, 2011).

For the rest of the scales in the study, Exploratory Factor Analyses (EFA) was performed by using IBM SPSS 20.0. As an extraction method, Principal Axis Factoring was used due to non-normal distribution of data (Tabachnick & Fidell, 2012). Additionally, direct oblimin was preferred as rotation method because this method allows factors to be correlated. Moreover, Cronbach alpha coefficients were estimated for each subscale of the GTA Survey Instrument. Results of each factor analysis and Cronbach's alpha coefficients are reported in the following sections.

3.6.3.1 Confirmatory factor analysis for the GTA Teaching Self-Efficacy Scale

The aim of running CFA for the GTA Teaching Self-Efficacy Scale was to confirm the second-order 2-factor structure proposed and tested by DeChenne (2010).

The second order CFA resulted in significant chi-square value and following fit indices: χ^2 (134, n = 101) = 263.98, CFI = .76, NNFI = .72, RMSEA = .10, and SRMR = .09. When modification indices of errors were examined, ε_7- ε_8 was the only pair with high error covariance; therefore, these error terms were suggested to

be correlated with each other. Errors belonged to item 7 and item 8 were allowed to be correlated, because these items loaded on the same factor. Additional covariance changed the results as follows: χ^2 (133, n = 101) = 251.52, CFI = .78, NNFI = .74, RMSEA = .09, and SRMR = .09. The Chi-square result was significant and this is an indicator of poor fit. This test is a sample size dependent technique but other fit indices, CFI, NNFI, RMSEA, and SRMR, are indicators of fit in case of significant chi-square (Byrne, 2001). RMSEA value was an evidence for mediocre fit. Figure 3.1 displays factor structure of GTA Teaching Self-Efficacy Scale with standardized estimates.

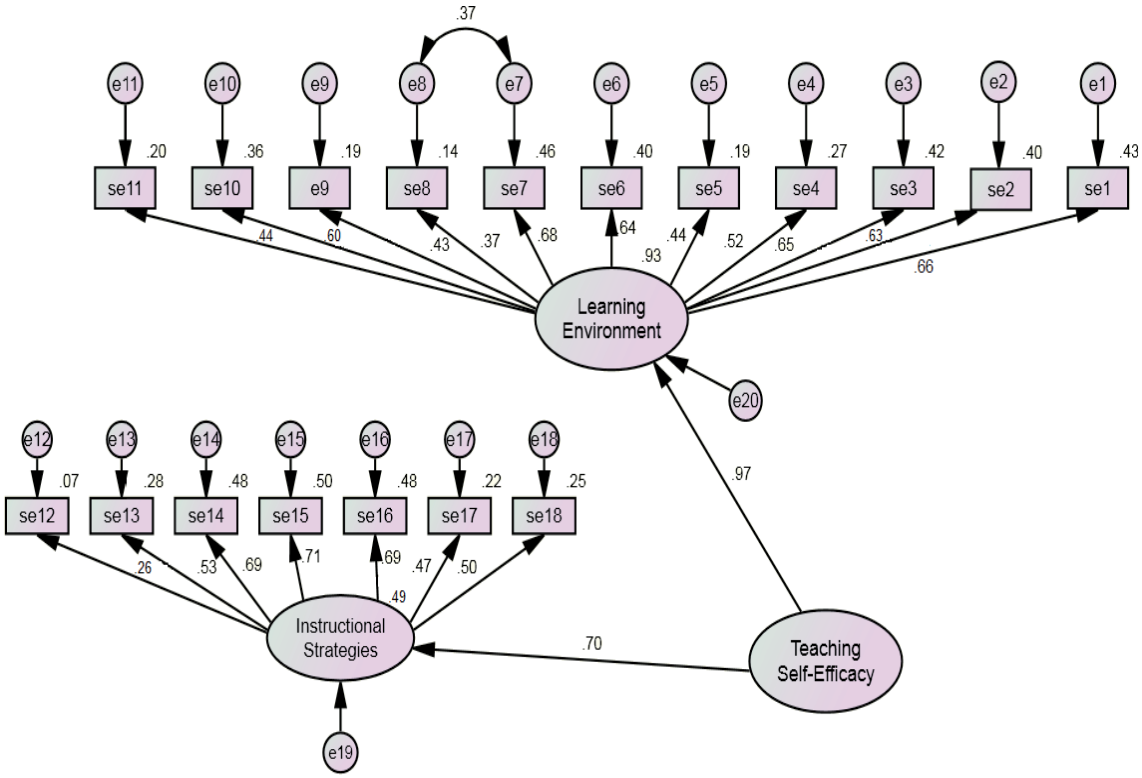

Figure 3.1 GTA Teaching Self-Efficacy Scale's Factor Structure with Standardized Estimates

As an indicator of internal consistency, Cronbach alpha coefficients were found as follows: .83 for *learning environment* and .75 for *instructional strategies.* These values are satisfactory indicating consistency within each factor (Nunnally & Bernstein, 1994).

3.6.3.2 Exploratory factor analysis for the Value Attributed to College Teaching Scale

Assumptions of EFA were checked before conducting the analysis. These are presence of metric variables, significant result of Bartlett's test of Sphericity, Kaiser-Meyer Olkin value above .60, multivariate normality, and absence of outliers (Hair, Anderson, Tatham, & Black, 2006). Assessment was done on a metric scale. An indicator for non-zero correlations among items was significant result of Bartlett's Test of Sphericity (292.51). KMO value (.85) was above .60; therefore it was appropriate to conduct factor analysis. Outliers were examined via checking Mahalonobis Distance values. There were no extreme cases exceeding the critical value (16.91 for α = .05 and df = 9). Univariate normality was checked by examining skewness/kurtosis values, Kolmogorov-Smirnov and Shapiro-Wilks Tests, and histograms with normal curves. Except results of Kolmogorov-Smirnov and Shapiro-Wilks Tests, all the indicators showed normal distribution. However, the tests resulted in significant values. As Kolmogorov-Smirnov and Shapiro-Wilks tests were conservative statistical tests (Field, 2013), data were deemed to have a normal distribution. After checking univariate normality, the result of Mardia's test was examined for multivariate normality (Tabachnick & Fidell, 2012). Significant result (140.42, $p < .05$) of the Mardia's test indicated the violation of multivariate normality. Due to violation of multivariate normality, Principal Axis Factoring was selected as the extraction method to conduct the factor analysis (Costello & Osborne, 2005).

Factor analysis, with extraction method of principal axis factoring and rotation method of direct oblimin, resulted in one factor explaining 44.90% of the variance. Factor loadings ranged between .40 and .78 (Table 3.6). Reliability coefficient (Cronbach's alpha) of this scale (.84) exceeded .70, which is acceptable (Nunnally, 1978).

Table 3.6
Factor Loadings for One-Factor Solution for the Value Attributed to College Teaching Scale

Item	Factor Loading
1. It is important for me to stay current in the subjects I teach.	.40
2. It is important for me to create an effective classroom environment for learning.	.47
3. I care about spending time to students who need extra help.	.48
4. It is important for me to establish effective communication with students.	.68
5. I care about being a part of teaching at college.	.71
6. I value planning necessary for an effective instruction.	.78
7. It is essential for me to contribute to students' academic development.	.56
8. I care about providing students feedback on their performances.	.64
9. I value being an instructor who is good at teaching.	.75

3.6.3.3 Exploratory factor analysis for the Mastery Experience Scale

Preliminary assumptions were checked before conducting EFA for Mastery Experience Scale. Bartlett's Test of Sphericity resulted in significant value (211.83, $df = 28$, $p = .00$) and KMO (.82) exceeded .60. Only assumption of multivariate normality was violated because Mardia's Test gave significant result (91.54).

There were no case with Mahalonobis D value exceeding 15.51 (critical value for α =.05 and df = 8), thus no outlier appeared.

Due to multivariate non-normality, Principal Axis Factoring was preferred as an extraction method for exploratory factor analysis. Factor analysis resulted in one-factor solution (Table 3.7). One factor explained 43.58% of the variance. Loadings ranged between .42 and .71. Cronbach alpha coefficient of this scale (.81) was above the recommended value of .70 (Nunnally, 1978).

Table 3.7 *Factor Loadings for One-Factor Solution for the Mastery Experience Scale*

Item	Factor Loading
1. I had many meaningful opportunities for teaching during my profession.	.49
2. I remember clearly those times when I taught students well.	.64
3. I have learned a great deal from teaching in classroom.	.62
4. I got success while I was teaching.	.68
5. I am able to learn from my mistakes related to teaching.	.69
6. My coursework has helped me develop effective teaching strategies.	.71
7. Teaching well gives me a positive sense of personal success.	.48
8. I have developed many of my teaching skills by actually teaching.	.42

Note. In this table, original items of Mastery Experience dimension of Sources of Self-Efficacy Inventory (SSEI; Henson, 1999) are used not to cause any mistake due to translation. Adapted version (Capa-Aydin, Uzuntiryaki-Kondakci, Temli, & Tarkin, 2013) was utilized during the data collection in the current study.

3.6.3.4 Exploratory factor analysis for the GTA Teaching Experience Scale

For the GTA Teaching Experience Scale, Bartlett's Test of Sphericity was significant (388.91, $df = 55$, $p = .00$) and KMO value was .75, which was above .60. As in the previous scales, multivariate normality was the only assumption that was not met because Mardia's test resulted in a significant value (156.76). Outliers were checked via investigating Mahalonobis Distance values. None of the cases had Mahalonobis D value greater than 28.87 (critical value for $\alpha = .05$ and $df = 11$) and this result showed that multivariate outlier is not a concern for the data collected via this scale.

The number of factors to be extracted was determined as two and Principal Axis Factoring resulted in a 38.35% explained variance. Factor loadings ranged between .42 and .78 (Table 3.8). Reliability coefficient was acceptable (.84) since it was above .70 (Nunnally, 1978).

Table 3.8
Factor Loadings for One-Factor Solution for the GTA Teaching Experience Scale

Item	Factor Loading
10. Implementing different teaching techniques (e.g. lecture, problem solving, group work)	.78
6. Teaching students having different levels of knowledge and skills	.70
3. Motivating students	.70
5. Assisting distressed students	.68
11. Developing quizzes and exams	.63
8. Managing disruptive students	.62
9. Facilitating group discussions	.60
2. Presenting instructional materials to a large group of students	.59
7. Authority relationships in the classroom	.51
1. Grading quizzes and exams	.49
4. Interacting one-on-one with students	.42

3.6.3.5 Exploratory factor analysis for the Instructor's Support Scale

Bartlett's Test of Sphericity (670.14, df = 78, p = .00) was significant and KMO value (.88) was greater than .60. These results were indicators of applicability of factor analysis. Among other preliminary analysis, multivariate normality was violated due to significant result of Mardia's (242.75). For outlier check, Mahalonobis D values were below the critical value (22.36 for α = .05 and df = 13).

Two factors were extracted by principal axis factoring and 59.60% of variance was explained by these factors (Table 3.9). One of the factors was named as

teaching approach (with reliability coefficient of .85) and factor loadings were between .85 and .39. Out of 13 items, 7 items loaded on this factor. Sample items of this factor are: "the instructor is willing to make changes in teaching" (.85), "the instructor uses different teaching methods" (.76), and "the instructor is a role model of all aspects of professional teaching" (.73). Factor loadings of the second factor ranged between .92 and .37 and it was labeled as *instructional support for GTA.* Cronbach alpha for this factor was computed as .89. The sample items belonging to this factor are: "provides me assistance with classroom management techniques" (.92), "helps me to develop effective teaching strategies" (.83), and "shares his/her teaching experiences with me" (.72).

Table 3.9
Factor Loadings for Two-Factor Solution for the Instructor's Support Scale

Item	Factor Loading	
	1	2
Instructor who is a role model for me or whom I work with more;		
2. is willing to make renovations in teaching.	.85	
5. uses different instructional techniques (e.g. lecture, problem solving, group work)	.76	
11. is a role model of all aspects of professional teaching.	.73	
3. clearly defines his expectations from his students in class.	.70	
1. is a person who can easily communicate with his students.	.57	
6. shares his resources on teaching (e.g. book, slide) with me.	.50	
12. appropriately grades his students' exams/ assignments.	.39	
7. provides me assistance with classroom management techniques.		.92
8. helps me to develop a repertoire of effective teaching strategies.		.83
13. shares his teaching experiences with me.		.72
9. encourages me to apply my decisions in classroom.		.61
10. brainstorms with me to help develop lesson plans.		.45
4. provides his student timely and detailed feedback.		.37
Factor correlations		
Factor 1	-	
Factor 2	.68	-

3.6.3.6 Exploratory factor analysis for the Departmental Teaching Support Scale

Before conducting factor analysis, preliminary assumptions were checked. KMO was found as .91, which was greater than .60. Bartlett's Test of Sphericity (555.59, $df = 45$, $p = .00$) was significant and indicated that correlation matrix was different than the identity matrix (Tabachnick & Fidell, 2012). Only assumption of multivariate normality was violated because Mardia's Test resulted in a

significant value (135.26). There were no extreme case having a Mahalonobis D value greater than 18.31 (critical value for $\alpha = .05$ and $df = 10$).

Factor analysis with extraction method of principal axis factoring was resulted in one-factor solution explaining 53.71% of the variance. Factor loadings were ranged between .61 and .90 (Table 3.10). Reliability coefficient for this scale (.89) was found above recommended value of .70 (Nunnally, 1978). One of the items (item 10) from this scale was omitted due to low loading value (.03). This item was "instructors use teaching methods familiar to faculty members."

Table 3.10
Factor Loadings for One-Factor Solution for the Departmental Teaching Support Scale

Items	Factor Loading
In my department;	
8. GTAs are encouraged to experiment with newly learned teaching methods.	.90
9. GTAs are encouraged to implement their ideas to improve teaching.	.87
7. GTAs are encouraged to experience different teaching activities.	.87
6. Instructors shares innovations related to teaching.	.74
5. Instructors are committed to teaching besides research.	.69
1. GTAs are supported for innovations that they wish to try in their teaching.	.66
4. Participation of GTAs to seminars on teaching is supported.	.64
2. GTAs are provided with sufficient sources to be successful in carrying out their job.	.63
3. There is a platform (e.g. meetings, online forum) among instructors to share teaching experiences.	.61
10. Instructors use teaching strategies which the department is familiar.	.03

3.7 Data Collection Procedure

In the spring semester of 2013, instrument was submitted to METU Research Center for Applied Ethics to be reviewed in terms of ethical concerns. After the instrument was approved by the committee, permissions from ethics committees of other universities in the sample were obtained. To be more practical and due to time concerns, online survey was developed via using METU Survey Service (https://metusurvey.metu.edu.tr). As soon as the approval was received, e-mail addresses of graduate assistants were asked via official correspondence letters of METU. An invitation e-mail, a reminder e-mail, and a final e-mail were sent to participants in five days interval. Due to low response rate, participants were also visited at their offices. Firstly, head of the departments were visited and informed about details of the study. After the permission was received from the head of a department, GTAs were visited at their offices and asked to take the questionnaire, which took approximately 10 minutes to complete. Data collection was completed by the middle of November 2013 with 302 (response rate was 30.82%) completed the survey.

3.8 Data Analysis

Before further statistical analysis, data were screened to check whether there was any missing value, misentry, and extreme cases. The main analysis of this study was Structural Equation Modeling (SEM). Therefore, assumptions of this statistical method (i.e., univariate and multivariate normality, linearity, and outliers; Tabachnick & Fidell, 2012) were also examined.

In this study, data were collected via online and office visits. Before the main analyses, data were split into two groups regarding type of collection and a series of independent t-tests were performed to check the differences between data sets. Each t-test resulted in non significant difference between mean scores of study variables among data sets. That is, teaching self-efficacy, instructor support, mastery experience, departmental teaching support, teaching experience, and value attributed to college teaching do not change with respect to type of data collection. Therefore, data coming from online and paper survey were merged and used for further analysis. Lastly, data collected from four universities were compared through ANOVAs. Data coming from these universities were also merged for further analysis, because analyses resulted in no significant differences.

To provide evidence related to construct validity of the scales used in this study, Exploratory Factor Analysis (EFA) for GTA Experiences Scale and Confirmatory Factor Analysis (CFA) for GTA Teaching Efficacy Scale, Value Attributed to College Teaching Scale, Mastery Experiences Scale, Instructor's Support Scale, and Departmental Teaching Support Scale were performed. To test the proposed model, Structural Equation Modeling (SEM) was conducted. IBM SPSS 20.0 was used to conduct factor analysis, while CFA and SEM were performed by using AMOS 18.0 software. For all statistical analysis, .05 was the value selected as appropriate alpha level. In CFA and SEM, chi-Square, Comparative Fit Index (CFI), Non-normed Fit Index (NNFI; also known as Tucker Lewis index, TLI), Root Mean Square Error of Approximation (RMSEA),

and Standardized Root Mean Square Residual (SRMR) were examined and reported as indicators of model fit. Furthermore, parameter estimates are provided with standardized errors.

In order to report direct and indirect effects with significance results, bootstrapping method was performed in AMOS 18.0. This is a resampling method in which empirical estimation is generated to confirm the mediation effect (Cheung & Lau, 2008). In bootstrapping, number of samples was set to 500 to decrease Type I error (Curran & Finch, 1996) and 95% was selected to be the confidence interval.

The structural model is presented in Figure 3.2.

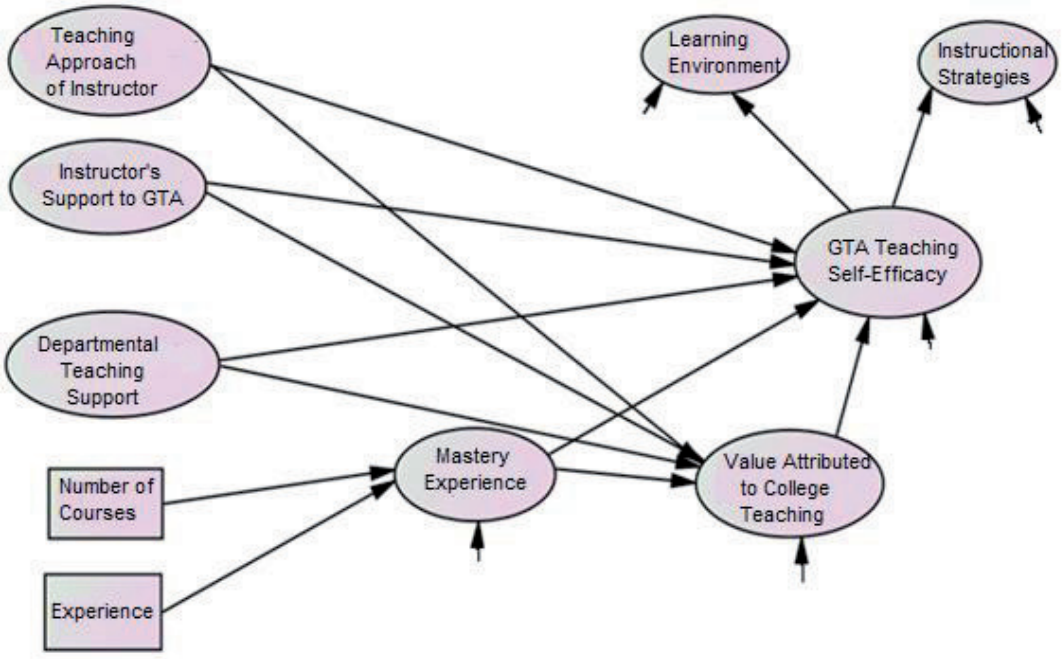

Figure 3.2 Structural Model Displaying the Relationship among Study Variables

Note. For the graphical clarity, indicators of the latent variables and correlations among the exogenous variables are not included in the Figure.

3.9 Limitations

This study has the following limitations:

1. Results are based on the relationship between study variables, which are limited by the current literature. Yet there may be other variables that would correlate with the study variables.
2. The study sample was selected from four state universities in Ankara. These universities were in the top ten of the University Ranking by Academic Performance 2013 list. Therefore, characteristics of these universities, such as performance in scientific publication, teaching approach, and infrastructure, are different compared to other universities. Therefore, generalizability of the results of this study is limited to STEM GTAs working in state universities in Ankara at top ten of URAP 2013 list.

CHAPTER IV

RESULTS

The purpose of the study was to test a statistical model examining the relationship among GTA teaching self-efficacy, their teaching experience, value they attribute to college teaching, their instructor's teaching support, and departmental teaching support. In accordance with this purpose, GTA Teaching Self-Efficacy Scale was adapted to Turkish context. For validation purposes, results of Confirmatory Factor Analysis (CFA) are presented in this chapter. In addition, findings of Exploratory Factor Analyses (EFA) for other instruments used in the current study are reported in this chapter. Lastly, estimates and fit indices as a result of model testing with the technique of Structural Equation Modeling (SEM) are provided.

4.1 Psychometric Characteristics of Scales

Prior to confirmatory and exploratory factor analysis, data including 302 GTAs were analyzed to check for multivariate outliers and normal distribution. The significant results of Mardia's Tests for each scale indicate violation of multivariate normality. However, maximum likelihood estimation is utilized in SEM. This estimation method is robust to moderate violations of unmodeled heterogeneity (Hox, Maas, & Brinkhuis, 2010); therefore, results were assumed

not to be influenced by the violation of multivariate normality. Examination of Mahalanobis D values for each scale showed the existence of 2 – 6 probable extreme cases. Omitting these cases had no significant effect on the findings of factor analysis. Therefore, these cases were retained in further analyses. In addition to factor analyses, reliability coefficients (Cronbach alpha coefficients) for each scale are also generated to define psychometric characteristics of the instrument.

4.1.1 GTA Teaching Self-Efficacy Scale

To confirm two-factor structure of the GTA Teaching Self-Efficacy Scale (DeChenne, 2010), the second-order CFA was run with a sample of 302 GTAs by AMOS 18.0 software (Arbuckle & Wothke, 1999). Analysis resulted in a significant chi-square, χ^2 (134, n = 302) = 659.32, p = .00. This result indicated that model was unacceptable. Other fit indices can be considered in case of significant chi-square, because chi-square is affected by sample size (Byrne, 2011). Fit indices were found as follows: CFI = .78, NNFI = .75, RMSEA = .11, and SRMR = .09. RMSEA value greater than .10 represents poor fitting model (MacCallum, Browne, & Sugawara, 1996). To modify the model, error covariances were investigated and the pair of ε_{12}- ε_{13} was allowed to covary. However, ε_2 was found to have negative variance after this change. Therefore, item 2 (“How confident am I in making students aware that I have a personal investment in them and in their learning?”) was omitted from the scale to have a better representing model for the data. Results were acceptable, χ^2 (117, n = 302) = 245.67, CFI = .94, NNFI = .93, RMSEA = .06 (90% CI = .07-.09), and SRMR = .06.

RMSEA value was an indicator of mediocre fit while SRMR value less than .08 is considered indicating good fitting model (Hu & Bentler, 1999). Therefore GTA Teaching Efficacy Scale with 17 items was taken into consideration for the further analyses. The second-order factor model is displayed in Figure 4.1. The standardized estimates of second-order factors were .73 and .93. They varied between .50 and .91 for the *learning environment* factor and varied between .40 and .79 for the *instructional strategies* factor. In addition, reliability coefficients were found as .86 (*learning environment*, 10 items) and .82 (*instructional strategies*, 7 items), deemed acceptable (Nunnally, 1978).

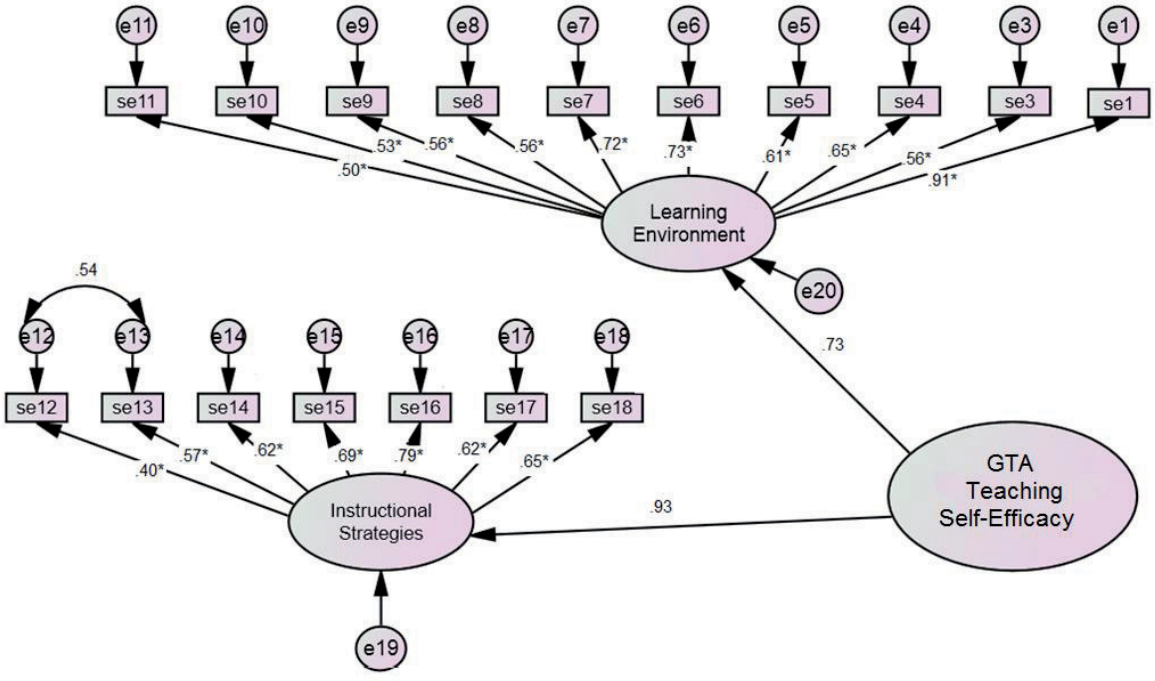

Figure 4.1 GTA Teaching Self-Efficacy Scale's Factor Structure with Standardized Estimates

4.1.2 Value Attributed to College Teaching Scale

One-factor structure of Value Attributed to College Teaching Scale was tested through CFA. Factor structure with standardized estimates is displayed in Figure 4.2. Results were as follows: χ^2 (27, n = 302) = 84.87, CFI = .93, NNFI = .91, and RMSEA = .08. RMSEA value indicated fair fit. Standardized estimates ranged between .53 and .72. Internal consistency was satisfactory due to reliability coefficient of .85 (Nunnally, 1978).

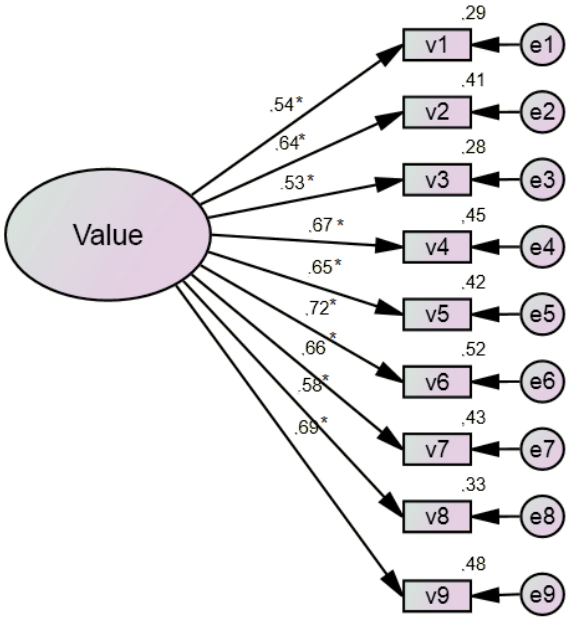

Figure 4.2 Value Attributed to College Teaching Scale's Factor Structure with Standardized Estimates

4.1.3 Mastery Experiences Scale

One factor structure of Mastery Experiences Scale was tested by CFA. Analysis yielded the following results: χ^2 (20, n = 302) = 29.25, CFI = .99, NNFI = .99, RMSEA = .04 (90% CI = .00 - .07), and SRMR = .03 (Figure 4.3). All fit indices, except chi-square, had satisfactory values. Especially, values of RMSEA and SRMR were less than .05 and this was an evidence for good fit. Standardized estimates also changed in a range of .53 and .71. Reliability coefficient of Mastery Experience Scale was found as .85 and this value was above the desired threshold of .70 (Nunnally, 1978).

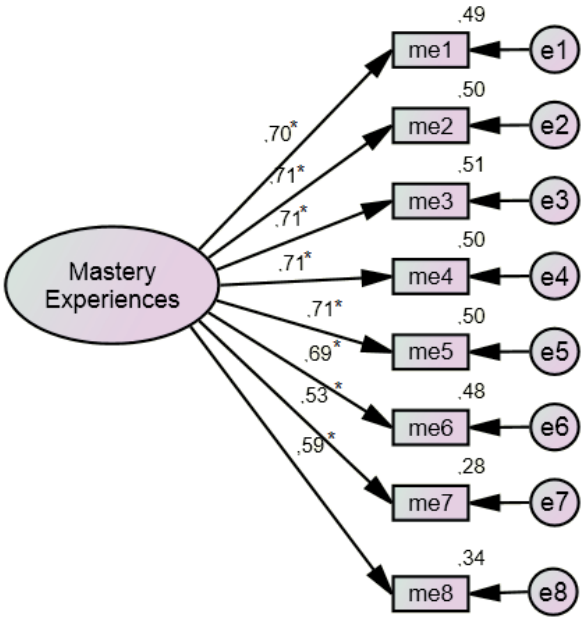

Figure 4.3 Mastery Experiences Scale's Factor Structure with Standardized Estimates

4.1.4 GTA Teaching Experience Scale

GTA Teaching Experience Scale was found to have one factor structure in the pilot study. The purpose of including this scale was to represent how frequently GTAs performed teaching activities. Therefore, this variable displayed as an observed (manifest) variable in the structural model. Reliability analysis of this scale yielded a satisfactory reliability coefficient of .84, which is an acceptable value according to criteria of Nunnally (1978).

4.1.5 Instructor's Support Scale

The first attempt of CFA for the Instructor's Support Scale resulted in unsatisfactory findings, χ^2 (64, n = 302) = 328.56, CFI = .93, NNFI = .91, and RMSEA = .12. Therefore, modification indices were examined and appropriate pairs of errors were detected. Error pairs of ε_1- ε_4 and ε_7- ε_8 were allowed to covary. After this change, results refined as follows: χ^2 (55, n = 302) = 219.25, CFI = .96, NNFI = .94, RMSEA = .09 (90% CI = .07-.10), and SRMR = .04. RMSEA value of .09 showed mediocre fit (Kaplan, 2009). Figure 4.4 displays the final factor structure of Instructors' Support Scale. The first factor, *teaching approach,* had 7 items with standardized estimates between .70 and .96. The second factor, *instructional support for GTA,* had 6 items with standardized estimates between .71 and .82. Reliability coefficients for two dimensions of the scale were found as: .91 and .89. These values were greater than .70 (Nunnally, 1978).

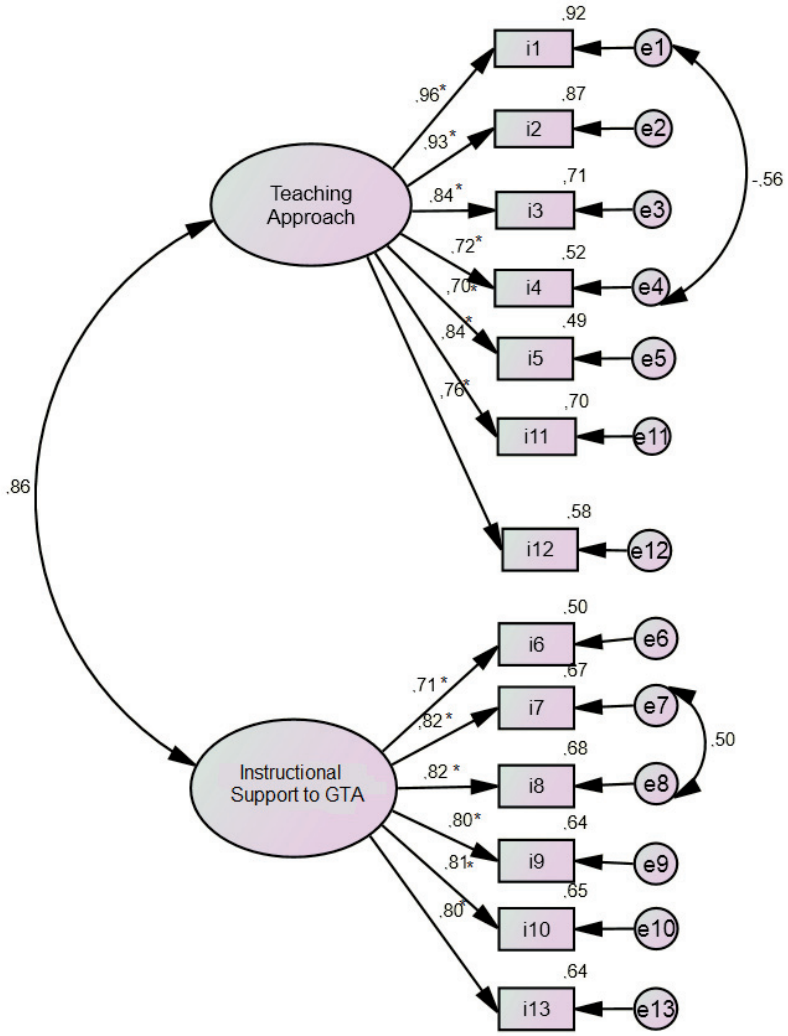

Figure 4.4 Instructors' Support Scale's Factor Structure with Standardized Estimates

4.1.6 Departmental Teaching Support Scale

CFA for the Departmental Teaching Support Scale resulted in the following fit indices: χ^2 (14, n = 302) = 114.66, CFI = .93, NNFI = .90, and RMSEA = .16. These findings indicated poor fit. Investigation of modification indices between error

terms resulted in allowing error pairs to covary: ε_1- ε_2 and ε_3- ε_4. Adding error covariances improved the findings as follows: χ^2 (12, n = 302) = 44.01, CFI = .98, NNFI = .96, RMSEA = .09 (90% CI = .04-.11), and SRMR = .02. RMSEA and SRMR implied mediocre fit. As displayed in Figure 4.5, standardized estimates ranged between .64 and .93. Reliability coefficient of this scale was found as .91, which is higher than the minimum acceptable level (.70) (Nunnally, 1978).

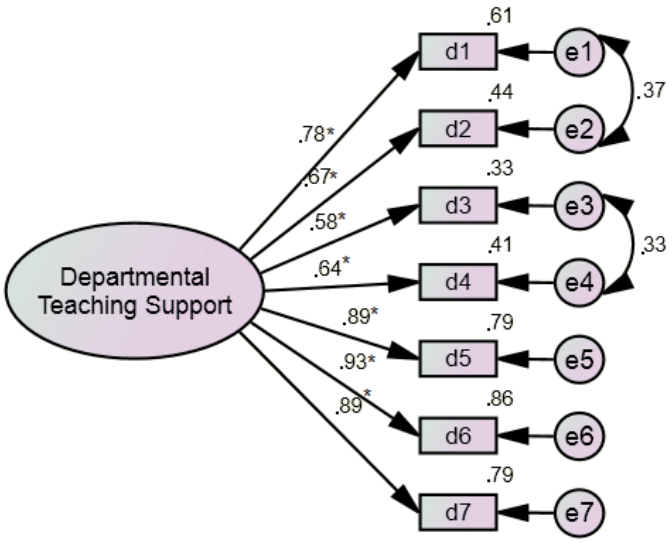

Figure 4.5 Departmental Teaching Support Scale's Factor Structure with Standardized Estimates

4.2 Descriptive Statistics

Descriptive statistics (mean, standard deviation, maximum, and minimum values) for each scale are displayed in Table 4.1. Considering two factors of the GTA Teaching Self-Efficacy Scale, there is a slight difference in two dimensions of GTA teaching self-efficacy: learning environment (M = 4.06, SD = .54) and instructional strategies (M = 4.17, SD = .53). When the support taken from the instructor and the department for teaching are compared descriptively, it seems that participants got teaching support from their role-model instructor (M = 3.79, SD = .94) more than other instructors in the department in general (M = 2.85, SD = .91).

With respect to 5-point scale, mastery experience (M = 4.15, SD = .57), teaching experience (M = 3.63, SD = .72), and value attributed to college teaching (M =4.48, SD = .43) were found to be relatively positive. Average number of different courses assisted was found as 5.01 (SD = 3.02). Descriptive statistics showed that duration of teaching experience at university was measured as in months with a mean of 41.05 (SD = 27.87) and it corresponded to approximately 3.5 years of experience on the average.

Table 4.1
Descriptive Statistics

Variable	*M*	*SD*
Teaching Self-Efficacy		
Learning Environment	4.06	.54
Instructional Strategies	4.17	.53
Mastery Experience	4.15	.57
Teaching Experience	3.63	.72
Value Attributed to College Teaching	4.48	.43
Instructor's Support		
Teaching Approach of Instructor	4.17	.87
Instructor's Support for Teaching	3.79	.94
Departmental Teaching Support	2.85	.91
Number of Different Courses Assisted	5.00	3.00

Correlations among study variables are presented in Table 4.2. Dimensions of teaching self-efficacy (*learning environment* and *instructional strategies*) were found to have a high correlation (.61). Similarly, dimensions of instructor's support were significantly correlated (.79). All the correlations among study variables were found as positive. Number of courses assisted significantly correlated (.20) with only mastery experience.

Table 4.2
Correlation between Variables

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
1. Learning Environment	-								
2. Instructional Strategies	.61*	-							
3. Mastery Experience	.44*	.49*	-						
4. Teaching Experience	.24*	.14*	.57*	-					
5. Value Attributed to College Teaching	.57*	.54*	.43*	.42*	-				
6.Teaching Approach of Instructor	.79*	.24*	.14*	.12*	.20*	-			
7. Instructor's Support for Teaching	.25*	.24*	.14*	.16*	.22*	.79*	-		
8. Departmental Teaching Support	.16*	.61*	.07	.11	.20*	.27*	.24*	-	
9. Number of Courses Assisted	.07	.06	.20*	.09	.06	.09	.09	.04	-

*$p < .05$

4.3 Structural Equation Modeling

Prior to main analysis, assumptions were checked and missing value analysis was employed to overcome possible problems, which might occur with conducting structural equation modeling. Outliers were investigated checking Mahalonobis Distance values for each case. There were 23 cases, which had Mahalonobis D value greater than the critical value. These cases were removed from the data file and analysis was repeated to check whether these cases had a

significant influence on the results. Analysis results indicated that there was not any considerable change compared to previous results. Therefore, 23 cases identified as possible outliers were decided to be retained in the data. Lastly, percentages of missing values were lower than 5%; hence, analysis of missing values was not required (Tabachnick & Fidell, 2012). *Expectation maximization* technique was used to impute missing values (Allison, 2002) because missing values were found to be at random pattern by Little's MCAR Test (Little & Rubin, 1987).

The statistical model examining the relationship among GTAs self-efficacy in teaching, their teaching experience, mastery experiences, their instructor's support, departmental support for instruction, and value attributed to teaching was tested by using AMOS 18.0 software. Initially, the following fit indices were examined: χ^2, CFI, NNFI, RMSEA, and SRMR. In addition to fit indices, parameter estimates (and corresponding standard errors) were examined to explore the relationship between latent factors and manifest variables. Lastly, the squared multiple correlation coefficients (R^2) were examined to show the amount of variance explained for each endogenous variable.

Model testing resulted in following chi-square and fit indices: χ^2 (1449, n = 302) = 2351.90, p = .00, CFI = .91, NNFI = .90, and SRMR = .08. Values of CFI and NNFI are greater than .90 and these are indicators of good fit (Bentler, 1992). Additionally, RMSEA was found as .05 (90% Confidence Interval = .05 - .07) and this value is an evidence for mediocre fit (Browne & Cudeck, 1993). Lastly, SRMR value (.08) less than .10 indicated acceptable fit (Kline, 2011).

The model with parameter estimates is also displayed graphically in Figure 4.6. Standard errors ranged between .01 and .08. The unstandardized parameter estimates with corresponding standard errors are displayed in Table 4.3.

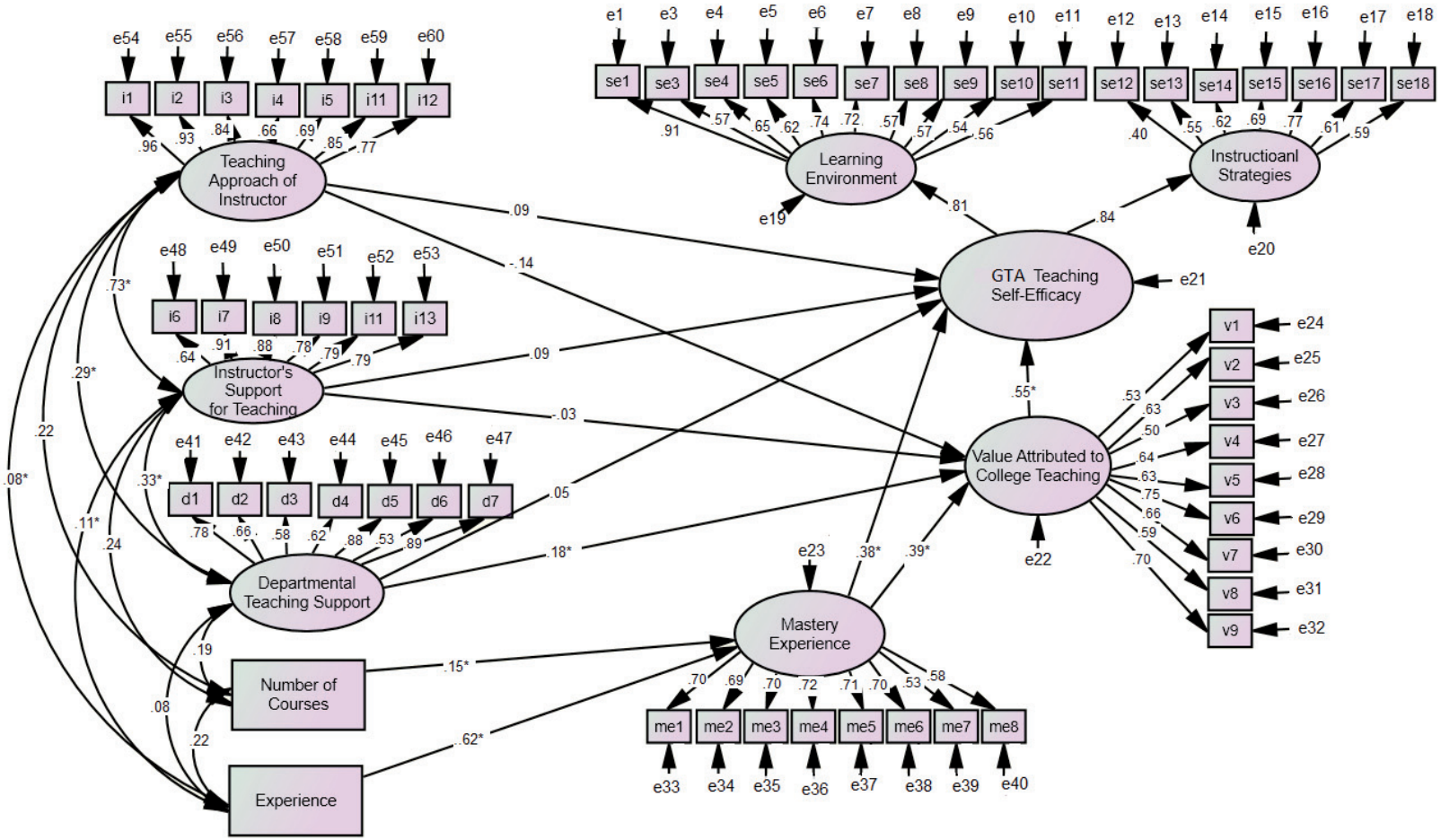

Figure 4.6 Structural Model with Standardized Parameter Estimates

Note. Significant regression weights are displayed with star (*).

Table 4.3

Unstandardized Estimates for Latent and Manifest Variables

Variables	*Estimate*	*SE*
Regression Weights		
Value Attributed to College Teaching ← Departmental Teaching Support	.06*	.02
Value Attributed to College Teaching ← Instructor's Support	.06	.05
Value Attributed to College Teaching ← Teaching Approach of Instructor	-.02	.05
Value Attributed to College Teaching ← Mastery Experience	.34*	.05
Mastery Experience ← Experiences	.43*	.05
Mastery Experience ← Number of Courses	.03*	.01
GTA Teaching Self-Efficacy ← Value Attributed to College Teaching	.54*	.08
GTA Teaching Self-Efficacy ← Mastery Experiences	.34*	.05
GTA Teaching Self-Efficacy ← Departmental Teaching Support	.02	.02
GTA Teaching Self-Efficacy ← Instructor's Support	.03	.05
GTA Teaching Self-Efficacy ← Teaching Approach of Instructor	.02	.04
Learning Environment ← GTA Teaching Self-Efficacy	1.00	
Instructional Strategies ← GTA Teaching Self-Efficacy	1.00	
Variances		
Learning Environment (e_{19})	.06*	.01
Instructional Strategies (e_{20})	.05*	.01
GTA Teaching Self-Efficacy (e_{21})	.03*	.01
Value Attributed to College Teaching (e_{22})	.08*	.01
Mastery Experience (e_{23})	.15*	.03

*$p<.05$

According to the results of model testing, GTA teaching self-efficacy was significantly predicted by mastery experience (β = .38) and value attributed to college teaching (β = .55). Instructor's support for teaching (β = .09) and teaching approach of instructor (β = .09) were found to be non significant factors in predicting teaching self-efficacy. Similarly, these variables had a non significant relationship with value attributed to college teaching.

Furthermore, departmental teaching support (β = .05) was a non significant predictor for GTA teaching self-efficacy. However, there was a significant relationship (β = .39) between value attributed to college teaching and departmental teaching support. Mastery experience was significantly predicted by number of courses assisted by GTAs (β = .15) and their teaching experience (β = .62). It is remarkable to find that experience has more contribution to mastery experience than the variable "number of courses." "Number of courses" indicates how many different courses a GTA assisted, whereas "experience" refers to the frequency of performing different teaching practices. That is, performing any teaching related activity rather than the number of courses is meaningful regarding mastery experiences. This result highlights that compared to instructors who closely work with GTAs, departmental teaching support has more influence on value attributed to college teaching. These findings indicate that as the successful performances in teaching and value attributed to college teaching increase, GTA teaching self-efficacy increases as well.

Indirect effects of exogenous variables on endogenous variables, i.e. mastery experiences, value attributed to teaching, and GTA teaching self-efficacy, were investigated through bootstrapping method (Byrne, 2001). Standardized direct, indirect, and total effects are displayed in Table 4.4. When indirect effects on GTA teaching self-efficacy were examined, four variables were found to have significant result. Departmental teaching support (β = .08), experience (β = .40), number of courses assisted (β = .10), and mastery experience (β = .26) were found to be significant predictors of GTA teaching self-efficacy through value attributed to college teaching. On the other hand, instructor's support (β = -.03) and instructor's teaching

approach (β = .09) had non-significant indirect effect on GTA teaching self-efficacy. Among the significant variables having indirect effect on GTA teaching self-efficacy, teaching experience and mastery experiences were found to be more salient compared to departmental support and number of courses which GTA assisted before.

Table 4.4
Standardized Direct, Indirect, and Total Effects

Predictor	*Criterion*	*Direct Effect*	*Indirect Effect*	*Total Effect*
Teaching Approach	Mastery Experience	-	-	-
	Value Attributed to College Teaching	-.05	.00	-.05
	GTA TSE	.06	-.03	.03
Instructor's Support	Mastery Experience	-	-	-
	Value Attributed to College Teaching	.16	.00	.16
	GTA TSE	.08	.09	.17
Departmental Teaching Support	Mastery Experience	-	-	-
	Value Attributed to College Teaching	.16*	.00	.16*
	GTA TSE	.05	.08*	.13*
Experiences	Mastery Experience	.62*	.00	.62*
	Value Attributed to College Teaching	.00	.30*	.30*
	GTA TSE	.00	.40*	.40*
Number of courses assisted	Mastery Experience	.15*	.00	.15*
	Value Attributed to College Teaching	.00	.07*	.07*
	GTA TSE	.00	.10*	.10*
Mastery experience	Value Attributed to College Teaching	.48*	.00	.48*
	GTA TSE	.38*	.26*	.64*
Value attributed to college teaching	GTA TSE	.54*	.00	.54*

*Note. GTA-TSE = GTA Teaching Self-Efficacy. *p <.05*

Finally, amount of variance in each endogenous variable explained by the model is checked by examining squared multiple correlation coefficients (R^2) of these variables (Table 4.5). Proportions of the variance explained by the overall model are as follows: 72% of the variance in GTA teaching self-efficacy, 42% of the variance in mastery experiences, 32% of the variance in value attributed to college teaching, 66% of the variance in instructional strategies, and 70% of the variance in learning environment.

Table 4.5
R^2 for Endogenous Variables (n = 302)

Variables	*Estimate*
GTA Teaching Self-Efficacy	.72
Mastery Experience	.42
Value Attributed to College Teaching	.32
Instructional Strategies	.66
Learning Environment	.70

4.4 Summary

In this study, the relationship among GTA teaching self-efficacy, instructor's support for teaching, departmental teaching support, teaching experience, mastery experience, value they attribute to college teaching, and number of courses they assisted was tested through Structural Equation Modeling. To measure GTA teaching self-efficacy, GTA Teaching Self-Efficacy Scale (DeChenne, 2010) was adapted in Turkish context. As in the original version, second-order two-factor structure of the scale was validated with acceptable reliability coefficients.

SEM analysis resulted in a moderate fit. Mastery experience and value attributed to college teaching were significant predictors of GTA teaching self-efficacy. While departmental teaching support has an influence on teaching self-efficacy through value, none of the two dimensions of Instructor's Support Scale (i.e., teaching approach of instructor and instructor's teaching support) were found as significant in estimating teaching self-efficacy. Mastery experience was significantly predicted by number of courses assisted by GTAs and their teaching experience. Moreover, the change in experience and number of courses assisted results in significant change of teaching self-efficacy via mastery experience. Finally, increase in teaching self-efficacy was found to be associated with increase in departmental teaching support through value attributed to college teaching. Overall model explained 72 percent of variance in GTA teaching self-efficacy.

CHAPTER V

DISCUSSION

In this chapter, initially the purpose and results of the study are summarized. Next, the findings are discussed with providing consistent and contradictory results of previous research. This chapter also includes implications for practice depending on the findings and recommendations for further research.

5.1 Summary of the Results

The main purpose of this study was to test a structural model among the variables including GTA teaching self-efficacy, instructor's teaching support, departmental teaching support, teaching experience, number of courses they assisted, their mastery experience, and value they attribute to college teaching. GTA Teaching Self-Efficacy Scale (DeChenne, 2010) was adapted to Turkish context and validated in order to measure GTA self-efficacy in college teaching practices. Findings indicated that the adapted version of GTA Teaching Self-Efficacy Scale (DeChenne, 2010) provided valid and reliable results for GTAs studying science, technology, engineering, and mathematics fields in Turkey. As the original scale developed by DeChenne (2010), the adapted version of GTA Teaching Self-Efficacy Scale has two-factor structure with satisfactory reliability coefficients.

Descriptive statistics revealed that there is a slight difference in two dimensions of GTA teaching self-efficacy. That is, GTAs have slightly higher level of self-efficacy beliefs in tasks to obtain appropriate learning environment than in practices related to developing instructional strategies. Participants reported that they got teaching support from their role-model instructor more than other instructors in the department in general. Considering the five-point scale used for the data collection instruments, mastery experience, teaching experience, and value attributed to college teaching were found to be relatively positive.

Structural Equation Modeling analysis resulted in moderate fit statistics with significant estimates and it showed that the proposed model fit to the data collected from GTAs. In this study, the outcome variable was GTA teaching self-efficacy and analysis indicated that 72% of the variance in teaching self-efficacy was explained directly by value attributed to college teaching and mastery experience, while indirectly by departmental teaching support, experience, and number of courses taught. Interestingly, teaching approach of instructor and instructor's support for teaching did not contribute either directly or indirectly to GTA teaching self-efficacy.

5.2 Discussion of the Results

According to the results of model testing, mastery experience and value attributed to college teaching were found as significant predictors of GTA teaching self-efficacy. The Mastery Experience Scale included items that refer to positive evaluations of teaching performance: "I have learned a great deal from teaching in classroom," "I got success while I was teaching," "Teaching

well gives me a positive sense of personal success." High scores in this scale was the indicator of positive reflection on their teaching performance. Therefore, it is not suprising to find the significant influence of mastery experience on teaching self-efficacy. Among four sources of self-efficacy (i.e., mastery experience, vicarious experience, social persuasion, and emotional arousal), mastery experience is the most powerful one. Once satisfying level of mastery experiences is acquired, influence of other sources becomes weaker (Bandura, 1997). Studies on teaching self-efficacy at K-12 level regarding these sources help to interpret the sources of teaching self-efficacy at college level, although studies on sources are limited in the context of college teaching (Morris & Usher, 2011). Teachers develop an understanding through evaluating their own experience in teaching and their judgment on their own performance impacts further teaching practices. Interpretation of teaching performance as a failure decreases the level of teaching self-efficacy (Tschannen-Moran & Hoy, 2007). Cognitive process of teaching experiences or interpretation of these experiences, i.e. analysis of a teaching task, is determinant in how sources of self-efficacy are effective on this belief (Tschannen-Moran, Woolfolk-Hoy & Hoy, 1998).

In the current study, value attributed to college teaching was another variable giving salient results regarding the relationship with the model variables. Value attributed to college teaching contributed to the greatest portion of variance in GTA teaching self-efficacy. Moreover, this variable was found to have a role in the indirect effect of teaching experience, number of courses assisted, and mastery experience on GTA teaching self-efficacy. Value, named as task value in literature on Expectancy-Value theory and motivation, has been focus of studies conducted to measure predictors of

student achievement. On the other hand, very few studies examined value within Expectancy-Value framework in higher education context. Yet, the relationship between efficacy beliefs and task value has a theoretical explanation. According to Eccles et al. (1983)'s Expectancy-Value theory, self-concept of one's abilities is directly related to one's value attached to a particular task. Epstein (1973) proposed that individuals consider the activities as important in which they feel confident. Both theorists claimed that self-efficacy belief in a particular task is related to value attributed to performing of that task as well.

Departmental teaching support was found to be a non-significant predictor for GTA teaching self-efficacy although it was significantly related to value attributed to college teaching. This relationship resulted in an indirect effect of departmental teaching support on GTA teaching self-efficacy through value attributed to college teaching. Departmental Teaching Support Scale included items on encouraging GTAs to implement new ideas in instruction, providing GTAs sources for instruction, and encouraging GTAs to experience different teaching practices. This positive atmosphere of the department was expected to contribute to GTA teaching self-efficacy. GTAs who are encouraged in their teaching practices were considered to have positive beliefs in their performance of college teaching. While this support makes GTAs give more meaning to college teaching, it does not influence their teaching self-efficacy. Prosser and Trigwell (1999) proposed that departmental support for teaching, academic workload, and managing the classroom are critical factors to motivate instructors for college teaching. GTAs experience various difficulties in their teaching practices while managing classroom, planning courses, and assessing student performance.

Encouragement and support of the department in instructional matters can build a positive climate. GTAs working in such an environment are expected to have higher motivation for teaching. Researchers investigating teaching self-efficacy at K-12 level recognize the effect of school environment on teaching self-efficacy regarding organizational support. According to Chester and Beaudin (1996), schools have the power to influence teaching self-efficacy by creating positive climate and facilitating collaboration within teachers through supervision and providing sources. Teacher self-efficacy has a strong correlation with organizational support and commitment to teaching (Coladarci, 1992). Supportive environment, in which feedback on performance is provided and ideas are shared, is also suggested to influence commitment to teaching. Teachers who are committed to teaching have higher sense of efficacy in teaching (Evans & Tribble, 1986).

Mastery experience was significantly predicted by number of courses assisted by GTAs and their teaching experience. It is remarkable to find that frequency of performing different teaching practices has more contribution to mastery experience than the number of courses. While "teaching experience" refers to the frequency of performing different teaching practices, "number of courses" variable indicates the number of different courses a GTA assisted. This finding showed that interpretation of teaching performance is more important than the quantity of courses assisted by GTA in predicting teaching self-efficacy. Regarding teaching self-efficacy, Prieto and Altmaier (1994)'s findings showed that teaching experience is a significant predictor of GTA teaching self-efficacy. However, in their study experience was measured as the number of semesters that a GTA assisted a course. Another study conducted by Prieto and his colleagues (2007) resulted

in a difference in GTA teaching self-efficacy based on different teaching roles (i.e., grader and lab assistant). GTAs who have teaching responsibility at laboratory session have higher level of self-efficacy compared to their peers who have non-instructional roles like grading. That means, type of responsibility in assisting a course has a more emphasis than duration of responsibility.

Contrary to significant findings, teaching approach of instructor and instructor's support for teaching had neither direct nor indirect significant effect on GTA teaching self-efficacy. This finding was surprising because these dimensions of Instructional Support Scale comprise items assessing the supervision of role-model instructor and GTA's observation of that instructor's teaching practices. Items of this scale define the characteristics of a role model instructor as following: "is a person who can easily communicate with his students," "appropriately grades his students' exams/ assignments," "helps me (GTA) to develop a repertoire of effective teaching strategies." However, it is not asked participants whether they compare their own performance and teaching approach with their role model instructor. GTAs scored positively in this scale, but their positive reflection regarding the approach and support of the instructor does not have a relationship with the belief in their own teaching performance. In their study with GTAs studying psychology, Prieto and Meyers (1999) found that supervision contributes to the change in college teaching self-efficacy. Supervision was reported as a predictor of teaching climate and development of teaching skills (Bomotti, 1994; Smith, 1993). Yet, Prieto and Meyers (1999) recommended that quality of supervision and how it is received by teaching assistants should be investigated. They also suggested for further research to

reach a consensus on the influence of supervision on self-efficacy. In teaching self-efficacy literature, observing others' teaching performance is asserted to have a role in terms of developing efficacy belief in teaching (Bandura, 1997). Yet, some researchers also obtained findings contrary to this expectation. For instance, Poulou (2007) investigated sources of pre-service teachers' self-efficacy in teaching and found that indirect or vicarious experience was not a significant predictor for none of the dimensions of teaching self-efficacy, i.e., efficacy for instructional strategies, efficacy for classroom management, and efficacy for student engagement. Similarly, Morris (2010), in a study with teachers working at K-12 level, reported that the contribution of vicarious experience to the variance in teaching self-efficacy was too low (0.8%). This contradiction is proposed to occur because it is difficult to measure indirect experience according to Pajares and Usher (2008).

Except instructor's support and departmental teaching support, relationship of model variables with main variable, i.e. teaching self-efficacy, was found to be significant as expected. As a vicarious experience, observing instructor's teaching performance was thought to be one of the strong predictors of teaching self-efficacy. However, vicarious experience is difficult to measure as it is clarified by Pajares and Usher (2008). Departmental teaching support was also considered as one of the sources of teaching self-efficacy, i.e. social persuasion, while developing the hypothesized model at the beginning of the study. Yet, this variable had an indirect effect on teaching self-efficacy through value attributed to college teaching. Regarding these results, it is possible to say that department's influence on GTA's teaching self-efficacy is more than that of an individual instructor although he/she is a role model for GTA or a faculty staff whom a GTA closely work.

5.3 Implications for Practice

In this study, GTA Teaching Self-Efficacy Scale was adapted to Turkish context with satisfactory psychometric properties. It is important to measure GTA teaching self-efficacy, because self-efficacy has a predictive nature (Bandura, 2006). That is, efficacy belief in a specific task is an indicator of how an individual will perform that task. Furthermore, Bandura (1997) suggested that self-efficacy is a task-specific construct. Therefore, teaching self-efficacy in college level needs to be assessed with a specific scale. The present study fulfills the need for college specific teaching efficacy scale in Turkish literature. In addition to this scale, *mastery experience* subdimension of Sources of Self-Efficacy Inventory (SSEI) was adapted for STEM GTAs. This inventory was adapted to Turkish by Capa-Aydin et al. (2013), however, only used with preservice teachers. This 8-item scale will help to assess the level of GTA mastery experience in college teaching.

The main purpose of this study was to examine the predictors of GTA teaching self-efficacy and findings showed that mastery experience and value attributed to college teaching contribute to the variance in teaching self-efficacy. Besides this result, not instructor's support but departmental teaching support was found to explain a small portion of variance in teaching self-efficacy. It is necessary to investigate GTAs' self-reflections on their teaching performances and provide them opportunity to experience instructional practices. Microteaching is a useful technique to observe GTA's performance, get his or her reflections, and provide feedback on unique practices (Millis & Samojlowicz, 2007). Furthermore, workshops and periodical meetings on teaching can contribute to the positive teaching

climate, because these activities bring faculty and teaching assistants together to discuss on teaching and learn about new instructional techniques and approaches.

Findings of the study indicated that the number of courses assisted and teaching experiences contribute to teaching self-efficacy through mastery experiences. Regarding this result, how frequently GTAs experience different teaching activities will have an influence. Therefore, training on measurement and evaluation, communication with students, and instructional techniques can help GTAs improve their performance in these activities. Furthermore, departmental teaching support was found to have an indirect effect on teaching self-efficacy through value attributed to teaching. Departmental teaching support, e.g., support for trying new methods and participation to seminars, providing GTAs teaching materials, will increase the value they attribute to college teaching and which in turn make GTAs have higher level of teaching self-efficacy. Therefore, administrators of departments can organize departmental meetings to bring instructors and GTAs together to share experience and discuss on teaching practices. Furthermore, instructors who are known for their success in teaching can be invited to these meetings from other departments and universities.

5.4 Recommendations for Future Research

GTA Teaching Self-Efficacy Scale is a measure, which was adapted and validated to assess teaching self-efficacy of GTAs studying science, technology, engineering, and mathematics (STEM). Duties of GTAs can be varied with respect to the department that they work in or their discipline of

study. STEM disciplines require laboratory hours and recitation hours. However, GTAs studying social sciences might have different experiences in teaching. Therefore, this scale needs to be tested and validated for GTAs studying social sciences as well.

In this study, teaching self-efficacy and its predictors were studied in a structural model via data collected from GTAs studying STEM disciplines. Their teaching self-efficacy was found to be predicted by mastery experience and value attributed to college teaching. The number of courses they assisted, departmental teaching support, and their teaching experience were found to have significant indirect effect on teaching self-efficacy. However, there is a need for examination of teaching self-efficacy for GTAs studying social sciences. Faculty of education can be an effective data source to study teaching self-efficacy, because faculty members and GTAs are already prepared for teaching role, i.e., they have pedagogical training. Therefore, they are aware of terminology and the importance of departmental teaching support, teaching experience, interacting with students, classroom management, and all other tasks related to teaching. However, their background on teaching covers the knowledge of K-12 level and below. They need to transfer this knowledge to teaching practices at college level. Further studies can be conducted in a comparative manner to understand whether there is a difference in teaching self-efficacy and its predictors among GTAs in different disciplines.

Literature of teaching self-efficacy includes studies indicating the influence of training on self-efficacy. In the current study, training on teaching was not a focus since there is no formal training on teaching provided for GTAs in

Turkey. However, training has recently started to be an important issue in the scope of faculty development programs. Future studies, especially utilizing experimental design, can be conducted to investigate cause-effect relationship between training and self-efficacy on teaching.

Results of this study revealed that most of the variance (72%) in GTA teaching self-efficacy is explained by the variables of this study. Sources of self-efficacy are examined through mastery experiences and vicarious experience (including instructor's support and departmental support). However, there are two other sources of self-efficacy proposed by Bandura (1997), i.e., social persuasion and emotional arousal, which are not considered in the current study. These two sources and factors affecting them can be focus of further studies. Regarding these sources, support from others such as peers, instructors, and other professionals (for social persuasion) and the level of stress, anxiety, and other psychological states (for emotional arousal) can be the factors to be investigated as predictors of teaching self-efficacy. Results of these studies can give opportunity to determine sources of GTA teaching self-efficacy and provide empirical evidence for developers of faculty development programs. Moreover, it would be helpful to investigate other predictors of teaching self-efficacy within Turkish context, because research on this issue is insufficient to reach a consensus.

The sample of the current study was selected from four state universities which were the top ten of the University Ranking by Academic Performance 2013 list. Compared to the other universities that are not in the top ten, these universities have similar characteristics in terms of work environment, instructional sources, and success level in terms of research and publication.

These factors may have an impact on GTA teaching self-efficacy and other variables of the current study. For further studies, it is recommended to collect data from other universities considering the variety in the year of foundation, location, facilities, and rate of publication.

Variables of this study are measured via data collection at a single point in time. Change in study variables is not the focus of this study, due to correlational design. However, longitudinal design in further studies may provide data on difference in teaching self-efficacy to extend the results of the current study. Furthermore, data were collected and analyzed via quantitative approach in this study. Qualitative techniques such as observation of GTAs' teaching performance, interviews with GTAs, and focus group may provide in-depth information about GTA teaching self-efficacy for further research. Qualitative research offers the advantage of multiple sources of evidence (Yin, 2011).

In addition, this study utilized an associational design in which predictors of GTA's teaching self-efficacy are tested by a statistical model. Experimentally designed studies can provide empirical proof to examine cause-and-effect relationship between significant predictors and GTA's teaching self-efficacy.

Besides GTA teaching self-efficacy, understanding faculty members teaching self-efficacy and its predictors can be beneficial in terms of obtaining information on the difference in teaching self-efficacy of GTAs and their experienced faculty members. Institutions and faculty developers might focus on different factors to improve and design training programs for GTAs and faculty members.

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APPENDICES

A. SAMPLE ITEMS FROM
TURKISH VERSION OF GTA SURVEY INSTRUMENT

BÖLÜM I

1. Cinsiyetiniz: ( ) Kadın ( ) Erkek

2. Şu an araştırma görevlisi olarak hangi üniversitede görev yapıyorsunuz?

3. Hangi lisansüstü derecesinde eğitim görüyorsunuz?

( ) Yüksek Lisans
( ) Doktora
( ) Bütünleşik doktora

4. Belirttiğiniz lisansüstü eğitimin kaçıncı dönemindesiniz? _____

5. Şu an hangi bölümde görev yapmaktasınız? _____

6. Hangi tarihte bu bölümde araştırma görevlisi olarak çalışmaya başladınız?
_____/_____ *(ay/ yıl)*

7. Kadro durumunuz:

( ) ÖYP
( ) 33. Madde veya 35. Madde
( ) 50. Madde (bölüm araştırma görevlisi)
( ) Diğer (*lütfen belirtiniz)* : _____

8. Bu zamana kadar kaç <u>dönem</u> ders asistanlığı yaptınız?

_____ [*Eğer ders asistanlığı yapmadıysanız boşluğa "0" (sıfır) yazınız*]

9. Bu zamana kadar kaç <u>farklı derste</u> asistanlık yaptınız?

_____ [*Eğer deneyiminiz yoksa boşluğa "0" (sıfır) yazınız*]

10. Bu zamana kadarki görevinizde, <u>öncelikli</u> öğretim görevinizi tanımlamada aşağıdakilerden hangisi daha uygundur?

(a) Laboratuvar asistanı
(b) Etüt/çalışma grubu asistanı
(c) Not veren/ notlandıran

(d) Öğretim görevlisi/ ders veren
(e) Diğer (*lütfen belirtiniz):*_____

11. ODTÜ Eğitim Fakültesi'nde verilen EDS 660 (Yüksek Öğretimde Eğitim) dersini aldınız mı?

( ) Evet
( ) Hayır

12. Üniversitenizde öğretim teknikleriyle ilgili ders aldınız mı?

( ) Evet
( ) Hayır

13. Araştırma görevlisi olarak atandığınızdan beri, aşağıdakileri ne kadar gerçekleştirdiniz?

	Hiç	İki üç yılda bir	Her yıl	Yılda bir kereden daha fazla
1. Bölümümde eğitimle ilgili çalıştay/ seminere dinleyici olarak katılma	1	2	3	4
2. Bölümümde eğitimle ilgili çalıştay/ seminer verme	1	2	3	4
3. Alanımda eğitimle ilgili sempozyum/ konferansa (örn. mühendislik eğitimi konferansı) dinleyici olarak katılma	1	2	3	4
4. Alanımda eğitimle ilgili sempozyum/ konferansta (örn. mühendislik eğitimi konferansı) sunum yapma	1	2	3	4
5. Meslek derneğinin desteklediği eğitim/öğretimle ilgili konferansa dinleyici olarak katılma	1	2	3	4
6. Meslek derneğinin desteklediği eğitim/öğretimle ilgili konferansta sunum yapma	1	2	3	4
7. Meslektaşlarımla öğretimi tartışma	1	2	3	4

Sample items from GTA Teaching Self-Efficacy Scale

BÖLÜM II

…… kendime ne kadar güvenirim?	Hiç güvenmem	Çok az güvenirim	Biraz güvenirim	Oldukça güvenirim	Çok güvenirim
Öğrencilerin derslerime katılımını teşvik etmede	1	2	3	4	5
Öğrencilerimi aktif öğrenenler (bilgiyi alan yerine onu inşa edenler) olarak düşünmede	1	2	3	4	5
Derslerimi planlamak için gereken zamanı kullanmada	1	2	3	4	5
Öğrettiğim konuyla ilgili bilgilerimi sürekli güncel tutmada	1	2	3	4	5

Sample items from Value Attributed to College Teaching Scale

BÖLÜM III

	Kesinlikle katılmıyorum	Katılmıyorum	Ne katılıyorum ne katılmıyorum	Katılıyorum	Kesinlikle katılıyorum
Etkili ders işlemek için gereken planlamayı yapmaya önem veririm.	1	2	3	4	5
Öğrencilerin akademik gelişimine katkıda bulunmak benim için önemlidir.	1	2	3	4	5
Öğretim elemanı olarak iyi eğitim vermeye önem veririm.	1	2	3	4	5

Sample items from Mastery Experience Scale

BÖLÜM IV

	Kesinlikle doğru değil	Genellikle doğru değil	Bazen doğru	Çoğunlukla doğru	Her zaman doğru
Sınıf içindeki öğretme deneyimlerimden çok şey öğrendim.	1	2	3	4	5
Öğrencilere bir şeyler öğretmeye çalışırken başarılı oldum.	1	2	3	4	5
Öğretimle ilgili hatalarımdan ders çıkarabilirim.	1	2	3	4	5

Sample items from GTA Teaching Experience Scale

BÖLÜM V

	Hiç	Ara sıra	Bazen	Sık sık	Her zaman
Sınıfta otorite ilişkileri kurma	1	2	3	4	5
Dersin akışını bozan öğrencilerle başa çıkma	1	2	3	4	5
Sınav veya quiz hazırlama	1	2	3	4	5

Sample items from Instructor's Support Scale

BÖLÜM VI

Öğretimini model aldığım veya en çok birlikte çalıştığım öğretim üyesi;	Kesinlikle katılmıyorum	Katılmıyorum	Ne katılıyorum ne katılmıyorum	Katılıyorum	Kesinlikle katılıyorum
Derslerinde öğrencilerinden beklentilerini açıkça ifade eder.	1	2	3	4	5
Farklı öğretim yöntemleri (örn. düz anlatım, problem çözme, grup çalışması) kullanır.	1	2	3	4	5
Sınıf yönetimi teknikleri konusunda bana destek sağlar.	1	2	3	4	5
Etkili öğretim stratejileri geliştirmem konusunda bana yardımcı olur.	1	2	3	4	5

Sample items from Departmental Teaching Support Scale

BÖLÜM VII

Bölümümde;	Kesinlikle katılmıyorum	Katılmıyorum	Ne katılıyorum ne katılmıyorum	Katılıyorum	Kesinlikle katılıyorum
Asistanların öğretim üzerine seminer ve çalıştaylara katılımı desteklenir.	1	2	3	4	5
Öğretim üyeleri, öğretimle ilgili yenilikleri asistanlarla paylaşır.	1	2	3	4	5
Asistanlar yeni öğrendikleri öğretim yöntemlerini uygulama konusunda teşvik edilir.	1	2	3	4	5

B. PERMISSION LETTER

Rana Ceylandag <franac@gmail.com>

Sue Ellen DeChenne Thu, Dec 27, 2012 at 8:03 PM
To: Rana Ceylandag <raceylan@metu.edu.tr>

Rana,

You have my permission. I've attached the tables from the current paper that is about ready to be submitted for publication. They have the most current statistical information. Please do not distribute them. Thanks!

Sue Ellen

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C. TURKISH SUMMARY

TÜRKÇE ÖZET

1. GİRİŞ

1.1 Çalışmanın Amacı

Bu çalışmanın amacı, araştırma görevlilerinin üniversitede öğretime yönelik özyeterliklerini, rol model aldıkları ya da yakın çalıştıkları öğretim üyesinin desteğini, bölümün öğretime dair desteğini, araştırma görevlilerinin öğretim deneyimini, asistanlığını yaptıkları ders sayısını, doğrudan deneyimlerini ve üniversitede öğretime atfettikleri değer arasındaki yapısal modeli test etmektir. Çalışma verileri Ankara'daki dört devlet üniversitesinin fen, teknoloji, mühendislik ve matematik bölümlerinde çalışan araştırma görevlilerinden toplanmıştır.

1.2 Çalışmanın Önemi

Ana değişkenin öğretime yönelik özyeterlik olduğu ve bu değişkeni yordayan faktörleri içeren bir modelin test edilmesini amaçlayan bu bu çalışmada, Araştırma Görevlilerinin Öğretime dair Özyeterliği Ölçeği (GTA Teaching Self-Efficacy Scale; DeChenne, 2010) Türkçe'ye adapte edilmiş ve geçerliği test edilmiştir. Bu amaçla elde edilen araştırma bulguları, araştırma görevlilerinin öğretim deneyimlerini, bölümün onlara sağladığı öğretim desteğini, araştırma görevlilerinin ünversitede öğretime verdikleri değeri ve öğretime dair özyeterliklerini anlama açısından katkıda bulunacaktır.

Sonuçların özellikle de araştırma görevlilerinin üniversitede öğretime dair özyeterliği üzerine alan yazına katkıda bulunması beklenmektedir. Modelin analizi ile üniversitede öğretime dair özyeterlikle ilişkili değişkenlerin incelenmesi hedeflenmektedir. Yapısal modele alınan değişkenlerden bölümün öğretim desteği, öğretim atmosferini oluşturan etmenlerden biridir ve yenilikçi fikirleri ve var olan becerileri geliştirmeye yönelik eğitimler için sağlanan kaynakları kapsamaktadır (Notarianni-Girad, 1999). Bu doğrultuda bölümün sağladığı öğretim desteğini ölçmek amacıyla geliştirilen ölçek, bölümdeki öğretim üyelerinin öğretime dair fikir ve deneyimlerini ne kadar paylaştığı ve araştırma görevilerine yeni yaklaşımları denemeleri konusunda ne kadar destek verdiklerini sorgulayan maddeler içermektedir. Öğretime dair danışmanlık, destek ve eğitim, üniversitede öğretime dair özyeterliğe katkı sağlayan faktörler olduğundan (Prieto ve Meyers, 1999; Prieto, Yamokoski ve Meyers, 2007), bu desteğin araştırma görevilerinin de özyeterliğine katkısını anlamak önemlidir. Önceki çalışmalardaki bütüncül olmayan yaklaşıma karşın, bu çalışmada üniversitede öğretime dair özyeterliğe ilişkili olacağı düşünülen değişkenler tek bir modelde incelenmektedir. Modelin analizinden elde edilen sonuçların, öğretime dair özyeterlik, öğretim deneyimi, bölümün öğretim desteği ve öğretime atfedilen değer değişkenleri arasındaki ilişkiyi açıklığa kavuşturarak öğretim üyesi yetiştirme programlarını geliştiren uzmanlara da önemli bilgiler sunması beklenmektedir.

Öğretime dair özyeterlik, öğretmen kalıcılığı ve öğrenci başarısı üzerinde etkisi olan bir değişkendir (Tschannen-Moran, Woolfolk-Hoy ve Hoy, 1998). Özyeterliğin önemli bir özelliği de gelecekteki performansı yordamadaki rolüdür. Kişilerin özyeterlikleri gelecekte gösterecekleri performansın da

göstergesidir (Bandura, 2006). Bu nedenle, araştırma görevlilerini öğretime dair özyeterliklerini anlamak onların ileride öğretim üyesi olduklarında sergileyecekleri öğretim performansına dair fikir verecektir. Öğretime dair özyeterlik öğretmenliğin ilerleyen yıllarında değişime kapalı hale gelir. (Tschannen-Moran ve diğerleri, 1998). Dahası, öğretmenliğin ilk yıllarında geliştirilen olumlu özyeterlik inancı öğretime dair tutumların da olumlu olmasını sağlar (Woolfolk-Hoy ve Burke-Spero, 2005). Olumlu özyeterlik inancının geliştirilmesi açısından, öğretim üyesi olmadan önce üniversitede geçirilen süreç araştırma görevlileri için kritiktir. Bu yüzden, araştırma görevlilerinin öğretime dair özyeterliğiyle ilişkili olabilecek potansiyel değişkenleri incelemek önemlidir ve bu faktörlere katkıda bulunmak öğretime dair özyeterliğin de gelişmesini sağlayabilir.

2. YÖNTEM

2.1 Katılımcılar

Bu çalışmanın hedef popülasyonu Ankara'daki devlet üniversitelerinin fen, teknoloji, mühendislik ve matematik bölümlerinde çalışmakta olan araştırma görevlileridir. Araştırma verileri, Akademik Performansa göre Üniversite Sıralaması (URAP, 2013)'nda ilk ona giren ve Ankara'da yer alan devlet üniversitelerinde çalışmakta olan araştırma görevlilerinden toplanmıştır.

Çalışma grubunda, yalnızca fen, teknoloji, matematik ve mühendislik bölümlerinde çalışan araştırma görevlileri yer almıştır. Alan olarak yalnızca fen, matematik ve mühendislik bölümlerinde çalışan araştırma görevlilerinin seçilmesinin temel nedeni, bu böümlerin benzer disiplin yaklaşımının, ya da doğa bilimleri, olmasıdır. Bu bölümlerdeki öğretim yaşantılarının benzer

oluşu da diğer bir faktördür. Öğretime ayrılan süre her akademik disiplin için (Roskens ve Creswell, 1981) ve araştırma görevlilerinin öğretime dair yaklaşım ve ilgileri de bölümlerine dayalı olarak değişmektedir (Luo, Bellows ve Grady, 2000). Ayrıca doğa bilimleri alanında çalışan araştırma görevlilerinin öğretim yükü de diğer alanlarda çalışan araştırma görevlilerine nazaran daha fazladır. Bu yüzden, doğa bilimleri alanlarında çalışan araştırma görevlilerinin diğer alanlardaki meslektaşlarından farklı engellerle karşılaşmaktadırlar (Lindblom-Ylanne, Trigwell, Nevgi ve Ashwin, 2006). Bu araştırma görevlileri not okuma, laboratuar asistanlığı ve etüt saatleri gibi deneyimlerle yoğun bir öğretim yüküne sahiptirler (DeChenne, Enochs ve Needham, 2012). Bu çalışmada, alanlar arasında herhangi bir karşılaştırma amaçlanmadığı için sosyal bilimler alanlarındaki araştırma görevlileri çalışmaya dahil edilmemiştir.

Çalışma verilerinin toplandığı dört devlet üniveristesinin fen, matematik ve mühendislik bölümlerinde toplam 980 araştırma görevlisi çalışmaktadır. Online olarak hazırlanan anketin gönderildiği 980 araştırma görevlisinden dönüş oranı %16.33 (160) olmuştur. Bu oranı arttırmak amacıyla, araştırma görevlileri ofislerinde ziyaret edilerek çalışmaya gönüllü katılmaları istenmiştir. Bu yolla 142 kişi daha araştırmaya katılmış ve katılım oranı %30.82 (n = 302)'ye çıkmıştır. Katılımcıların demografik özelliklerine bakıldığında, yaklaşık yarısının kadın (%52.65) olduğu, çoğunluğu doktora adayı iken (%68.87), yüksek lisans öğrencisi olanların 74 (%24.50) kişi, bütünleşik programa devam edenlerin ise 16 kişi oladuğu belirlenmiştir. Katılımcıların hemen hemen yarısı (%54.97) sözleşmeli olarak (50/d) çalışmaktayken, %43.38'i kalıcı araştırma görevlisi (33. ve 35. Madde ya da ÖYP) kadrosundadır. Son olarak, katılımcıların araştırma görevlisi olarak

çalışma yılı incelendiğinde, 50 katılımcının bir yıldan daha az süredir görev yapmakta olduğu ve maksimum çalışma yılının 10 olduğu belirlenmiştir.

Araştırma görevlilerinin öğretim pratiklerini anlamak için öğretim üzerine eğitimlere katılımları ve öncelikli öğretim görevleri sorulmuştur. Öğretime dair seminer, eğitim ve konferanslara katılım üzerine maddelere 5'li skalada çoğunlukla 2'ye yakın değerler vermişlerdir. Ancak akranlarıyla öğretim üzerine tartışma (*Ort.* = 3.14, *SS* = 1.10) tercih ettikleri bir araç olmuştur. Çoğu katılımcı (%57.3) öncelikli öğretim rolünü laboratuar asistanı olarak belirtmiştir. Yalnızca 28 katılımcı (%9.3) bu rolü ödev ve sınav notlandırma olarak tanımlamıştır.

2.2 Veri Toplama Aracı

Araştırma anketi (Bkz. Ek A) yedi bölümden oluşmaktadır. Bu bölümlerin ilki, demografik özellikler üzerine 7 soru ve öğretim profili üzerine 8 soruyu kapsamaktadır. Diğer bölümler ise, Üniversitede Öğretime Yönelik Özyeterlik Ölçeği, Doğrudan Deneyim Ölçeği, Üniversitede Öğretime Atfedilen Değer Ölçeği, Öğretim Deneyimi Ölçeği, Öğretim Üyesi Desteği Ölçeği ve Bölümün Öğretim Desteği Ölçeği'nden oluşmaktadır.

İlk bölümde, cinsiyet, görevli olunan üniversite ve bölüm, lisansüstü eğitimin derecesi ve dönemi, görev süresi ve kadro durumu üzerine sorular bulunmaktadır. Bu bölümde ayrıca öğretim üzerine katıldıkları eğitim, seminer ve konferanslar üzerine 7 soru vardır. Bu sorular, Dey ve Hurtado (2000) tarafından yapılan Öğretim, Öğrenme ve Değerlendirme üzerine Fakülte Anketi'nden bu çalışma için adapte edilmiştir. Bu bölümde bir de araştırma görevlilerinin asistanlık yaptığı dönem sayısı, ders sayısı ve

öncelikli öğretim görevi üzerine üç madde bulunmaktadır. Öncelikli öğretim görevi için yanıt seçenekleri, laboratuar asistanı, etüt asistanı, notlandırma ve öğretim elemanı olarak kategorize edilmiştir.

İkinci bölüm, DeChenne (2010) tarafından geliştirilen 18 maddelik Araştırma Görevlilerinin Öğretime dair Özyeterlikleri Ölçeği'ni içerir. Ölçeğin orijinali Prieto Navorro (2005) tarafından geliştirilmiş olan Üniversitede Öğretime Yönelik Özyeterlik Ölçeği'dir. Bu ölçek, öğretim görevlisinin öğretimi ne düzeyde ve ne sıklıkta gerçekleştirdiğini iki adet 6'lı skalayı içeren 44 madde ile ölçmektedir. DeChenne (2010) sıklıkla ilgili skalayı çıkartmış ve 5'li skala kullanmıştır. Bunun yanında, 17 maddeyi de araştırma görevlilerine uymadığı için ölçekten çıkartmıştır. Ölçeği araştırma görevlilerine özgü hale getirmek amacıyla da dört yeni madde eklemiştir. Görünüş geçerliği için uzman görüşleri aldıktan sonra da bir madde daha ölçeeğe eklenmiştir. Böylece elde edilen 28 maddelik ölçek, "tamamen yetersiz"den (1) "tamamen yeterli"ye (5) doğru değişen 5'li skalayı içermiştir. Son olarak, 253 araştırma görevlisinden veri toplanarak ölçeğin geçerliği analiz edilmiştir. Elde edilen sonuçlara göre, farklı faktörlere yüklenen 10 madde ölçekten çıkartılmıştır. Böylece güvenirlik katsayıları yüksek iki faktörlü (α = .90, *öğrenme ortamı;* α = .85, *öğretim* stratejileri) yapıda, 18 maddelik bir ölçek elde edilmiştir. *Öğrenme ortamının* örnek maddeleri şöyledir: "öğrenme için olumlu bir öğrenme ortamı yaratma," "öğrencileri birbirleriyle iletişim için cesaretlendirme," "sınıfımda derse katılımı teşvik etme." Ölçeğin ikinci faktörüne, *öğretim stratejileri,* ait maddelere örnek olarak "kullanacağım öğretim materyallerini hazırlama," "öğreteceğim konularda güncel olanı yakalama," ve "öğrencilerimin akademik kapasitesini doğru bir şekilde

değerlendirme" yer almaktadır. Adaptasyon süreci, bir sonraki bölümde detaylarıyla aktarılacaktır.

Üçüncü bölüm, üniversitede öğretime atfedilen değeri ölçmek amacıya geliştirilmiş olan Üniversitede Öğretime Atfedilen Değer Ölçeği'ni içermektedir. Ölçeğin maddeleri, Eccles ve arkadaşları (1983) tarafından tanımlanan görev değerinin iki faktörü, içsel değer ve elde etme değeri dikkate alınarak geliştirilmiştir. Ölçeğin son hali, tamamen katılıyorum ile tamamen katılmıyorum arasında değişen 5'li skalada 9 maddeyi içermektedir. Ölçekte yer alan maddelerden bazıları şöyledir: "öğrencilerle etkili iletişim kurmak benim için önemlidir," "öğrettiğim konularda güncel olanı yakalamak benim için önemlidir," "öğrencilere performanslarıyla ilgili geri bildirim vermeyi önemserim."

Anketin dördüncü bölümü, ders asistanlığı yapılan dönem sayısını, asistanlık yapılan ders sayısını ve öncelikli öğretim görevi üzerine 3 soruyu içermektedir. Bu bölümden sonra gelen beşinci bölüm, Doğrudan Deneyim Ölçeği'ni içermektedir. Bu ölçek, Henson (1999) tarafından geliştirilen ve Çapa-Aydın, Uzuntiryaki-Kondakçı, Temli ve Tarkın (2013) tarafından Türkçe'ye adapte edilen Özyeterlik Kaynakları Ölçeği'nin doğrudan deneyimler boyutundaki 8 maddeyi içermektedir. Bu ölçeği içermedeki amaç, araştırma görevlilerinin kendi öğretim deneyimlerini nasıl yorumladıklarını anlamaktır. Özyeterlik Kaynakları Ölçeği 7'li skalada 27 maddeyi içermektedir ve Çapa Aydın ve arkadaşları (2013)'nın bulgularına göre 4 faktörlü bir yapıdadır: *Doğrudan deneyimler* (α = .75), *dolaylı deneyimler* (α = .78), *sözel ikna* (α = .76), ve *fizyolojik ve duygusal durum* (α = .75). Bu çalışmada, doğrudan deneyimler boyutu maddelerinden yalnızca biri

araştırma görevlilerine daha uygun hale getirilmek için değiştirilmiştir. Orijinal ölçekte "öğretim becerilerimin birçoğunu gerçekte öğreterek geliştirdim" olarak yer alan bu madde, "öğretim becerilerimin birçoğunu gerçek öğrenme ortamındaki deneyimlerimle edindim" olarak değiştirilmiştir.

Son üç bölümde kullanılan ölçekler, DeChenne (2010)'nin anketinden yola çıkılarak geliştirilmiştir. Altıncı bölümdeki, Öğretim Deneyimleri Ölçeği araştırma görevlilerinin notlandırma, grup tartışmalarını yönetme, öğrencilerle iletişim kurma gibi öğretime dair uygulamaları ne sıklıkta gerçekleştirdikleri sorulmuştur. DeChenne (2010)'nin kullandığı orijinal versiyonda 5'li skalada 15 madde varken bu çalışmada 9 madde kullanılmıştır. Orijinaldeki 6 madde pedagojik terimleri içerdiği için ölçekten çıkartılmıştır.

Son iki bölümde yer alan Öğretim Üyesi Desteği Ölçeği ve Bölümün Öğretim Desteği Ölçeği'ni geliştirmek için, DeChenne (2010)'nin geliştirdiği Bölüm Öğretim Ortamı Ölçeği'nden yararlanılmıştır. Orijinal ölçek, 5'li Likert skalada 18 maddeyi içermektedir. Ölçeğin geliştirilmesinde, Örgütsel İklim İndeksi (Hoy, Smith ve Sweetland, 2002) ve Öğretim Asistanı Eğitim Envanteri (Notarianni-Girard, 1998) ölçeklerinden faydalanılmıştır. Bölüm Öğretim Ortamı Ölçeği, "danışman öğretim ilişkisi" (α = .88), "akran öğretim ilişkisi" (α = .83) ve "araştırma görevlisi eğitimi" (α = .66) adında üç faktörü içermektedir. Bu çalışmada ise, "araştırma görevlisi eğitimi" maddeleri araştırma görevlilerine yönelik resmi bir eğitim olmadığından çıkartılmıştır. Bunun yerine, Mentor Destek Ölçeği (Capa ve Loadman, 2004)'nin 5 maddesindeki "mentor" ifadesi "öğretim üyesi" olarak değiştirilerek

eklenmiştir. Araştırma görevlilerinin öğretim üyelerinin kendilerine sağladığı desteği ve öğretime olan yaklaşımlarını, bölümde sağlanan öğretim desteğinden ayrı olarak değerlendirmeleri için ayrı iki ölçek şeklinde sunulmuştur. Öğretim Üyesi Desteği Ölçeği'nde rol model alınan ya da yakın çalışan öğretim üyesinin sağladığı öğretim desteği ve öğretim yaklaşımı üzerine 13 maddeyi içerirken, Bölümün Öğretim Desteği Ölçeği 10 madde içermektedir.

2.3 Ölçek Adaptasyonu

Bu çalışmada Türkçe'ye adapte edilen Araştırma Görevlilerinin Öğretime Yönelik Özyeterlikleri Ölçeği, Sue Ellen DeChenne tarafından Üniversitede Öğretime Yönelik Özyeterlik Ölçeği'nden (Prieto Navarro, 2005) faydalanılarak geliştirilmiş 18 maddelik bir ölçektir. Türkçe'ye uyarlama sürecinde öncelikle, Değerlendirme Temelli Ölçeklerin Kültürler Arası Uyarlama Süreci Kılavuzu (Beaton, Bombardier, Guillemi ve Ferraz, 2010)'ndaki adımlara uygun olarak ölçeğin çevirisi yapılmıştır. Bu adımlar, ilk çeviri, çevirinin gözden geçirilmesi, orijinal dile çeviri, çevrilen versiyonlar üzerinde fikir birliği ve son versiyonun denenmesi aşamalarını içermektedir. Ölçeğin ilk çevirisi, üç İngilizce öğretmeni tarafından yapılmıştır ve bu üç çeviri de araştırmacılar tarafından incelenmiştir. Bu aşamada karşılaşılan farklılıklar, çeviriyi gerçekleştiren uzmanlara kelime seçimindeki tercihlerinin nedenleri sorularak giderilmiş ve tek bir form elde edilmiştir. Bir sonraki adımda, iki yeni İngilizce öğretmeni ve bir çevirmen önceki adımda olduğu gibi birbirlerinden bağımsız olarak ölçeği orijinal dili olan Türkçe'ye çevirmişlerdir. Son olarak, araştırmacılar orijinal diline

çevrilmiş olan ölçek formunu asıl geliştirilmiş haliyle karşılaştırarak ifade olarak farklılık olmadığını saptamışlardır.

2.4 Veri Toplama Süreci

Araştırma anketi, 2013 yılı bahar döneminde ODTÜ Uygulamalı Etik Araştırma Merkezi'ne teslim edilmiştir. Gerekli izinlerin alınmasından sonra, diğer üç üniversitenin etik komitelerinden de veri toplama için izin talep edilmiş ve araştırma uygun bulunmuştur. Zaman açısından daha pratik olduğu düşünülerek, anket ODTÜ Anket Servisi (metusurvey.metu.edu.tr) üzerinden online olarak hazırlanmıştır. Araştırma görevlilerinin e-posta adresleri yapılan resmi yazışmalarla edinildikten sonra, bir davet e-postası, hatırlatıcı e-posta ve anket sonlandırma e-postası beş günlük aralıklarla katılımcılara gönderilmiştir. Online araştırma sonlandırıldığında geri dönüş oranının (% 16.33) düşük olması nedeniyle, araştırma görevlilerinin ofisleri ziyaret edilerek elden veri toplanmıştır. Bu ziyaretlerden önce her fakültede bölüm başkanları çalışma hakkında bilgilendirilmiş ve kendilerinden sözel olarak izin alınmıştır. Elden toplanan verilerle süreç 2013 yılı Kasım ayında tamamlanmış, toplamda 302 araştırma görevlisinden alınan veri ile çalışmaya katılım oranı % 30.82 olarak belirlenmiştir.

2.5 Veri Analizi

İstatistiksel analizleri gerçekleştirmeden önce, veriler herhangi bir kayıp veri ve yanlış veri girişini incelemek üzere taranmıştır. Çalışmanın esas analizi Yapısal Eşitlik Modeli (YEM)'dir. Bu nedenle, veri taramasından sonraki ilk

adım YEM analizinin varsayımlarının (tek ve çok değişkenli normal dağılım, doğrusallık ve uç değerler; Tabachnick ve Fidell, 2012) incelenmesi olmuştur.

Pilot çalışmada ölçeklerin yapı geçerliğini ölçmek için, Açımlayıcı Faktör Analizi yapılmıştır. Esas uygulamada toplanan verilerle Doğrulayıcı Faktör Analizi gerçekleştirilmiştir. Hem Yapısal Eşitlik Modeli hem de Doğrulayıcı Faktör Analizi için AMOS 18.0 programı kullanılırken, diğer tüm analizler IBM SPSS 20.0 programı tercih edilmiştir. Çalışmadaki tüm analizlerde alfa düzeyi olarak .05 değeri esas alınmıştır. Doğrulayıcı Faktör Analizi ve Yapısal Eşitlik Modeli'nde model uyumu için, ki-kare, karşılaştırmalı uyum indeksi (CFI, comparative fit index), normlaştırılmamış uyum indeksi (NNFI, non-normed fit index ya da Tucker Lewis index, TLI), kök ortalama kare yaklaşım hatası (RMSEA, root mean square error of approximation) ve standardize edilmiş kök ortalama kare hatası (SRMR, standardized root mean square residual) rapor edilmiştir.

Doğru ve dolaylı etkileri incelemek için bootstrap yöntemi kullanılmıştır. Bu yöntemde, Tip I hatayı önlemek için örneklemlerin sayısı 500 olarak belirlenmiş (Curran ve Finch, 1996) ve güven aralığı %95 olarak seçilmiştir.

3. BULGULAR

3.1 Betimsel Sonuçlar

Betimsel istatistik sonuçları tüm ölçekler için faktörleriyle birlikte raporlanmıştır (Bkz. Tablo 4.1). Araştırma Görevlilerinin Öğretime Yönelik Özyeterlikleri Ölçeği'nin iki faktörü olan *öğrenme ortamı* (*Ort.* = 4.06, *SS* = .54) ve *öğretim stratejileri* (*Ort.* = 4.17, *SS* = .53) ortalamaları göz önüne alındığında, ikisi arasında çok az bir fark olduğu saptanmıştır. Öğretime dair destek açısından bakıldığında, araştırma görevlileri bölümden aldıkları öğretim desteğine (*Ort.* = 2.85, *SS* = .91). nazaran rol model aldıkları ya da yakın çalıştıkları öğretim üyesinden daha çok destek (*Ort.* = 3.79, *SS* = .94) aldıklarını rapor etmişlerdir.

Araştırma görevlilerinin doğrudan deneyimleri (*Ort.* = 4.15, *SS* = .57), öğretim deneyimleri (*Ort.* = 3.63, *SS* = .72) ve üniversitede öğretime atfettikleri değer (*Ort.* = 4.48, *SS* = .43) 5'li skala üzerinden değerlendirildiğinde pozitiftir. Asistanlık yapılan farklı ders sayısı ortalama 5.01 (*SS* = 3.02) olarak bulunmuştur. Öğretim deneyimi süresi ay olarak hesaplandığında ortalama 41.05 (*SS* = 27.87) iken bu değer ortalama olarak yaklaşık 3.5 yıla karşılık gelmektedir.

3.2 Yapısal Eşitlik Modeli Analizi

Model analizi sonuçlarına göre elde edilen ki-kare ve uyum indeksleri şöyledir: χ^2 (1449, n = 302) = 2351.90, p = .00, CFI = .91, NNFI = .90 ve SRMR = .08. CFI ve NNFI değerleri .90'ın üzerinde olduğundan modelin veriye

uyumu söz konusudur (Bentler, 1992). Ayrıca .05 olarak bulunan RMSEA (90% Güven Aralığı = .05 - .07) değeri de uyumun bir göstergesidir (Browne ve Cudeck, 1993). Son olarak, .10'un altında hesaplanan SRMR değeri (.08) model veri uyumuna işaret etmektedir (Kline, 2011). Yapısal model ve elde edilen değerler Şekil 4.6'ta gösterilmiştir.

Yapısal Eşitlik Modeli analizi ile, araştırma görevlilerinin öğretime dair özyeterlikleri doğrudan deneyimleri (β = .38) ve öğretime atfettikleri değer (β = .55) ile anlamlı olarak yordandığı sonucuna ulaşılmıştır. Ancak analiz bulgularına göre, öğretim üyesinin öğretime dair desteği (β = .09) ve öğretime dair yaklaşımı (β = .09) öğretime dair özyeterliği yordamada anlamlı değildir. Benzer şekilde, bu değişkenler öğretime atfedilen değer için de anlamlı sonuç vermemiştir. Yine bölümün öğretime dair desteği (β = .05) de öğretime yönelik özyeterliği yordamada anlamsız bir değişken olarak bulunmuştur. Öte yandan, bu değişken öğretime atfedilen değer değişkeni ile anlamlı bir ilişkiye (β = .39) sahiptir.

Doğrudan deneyimler, asistanlık yapılan ders sayısı (β = .15) ve öğretim deneyimi (β = .62) tarafından anlamlı olarak yordanmaktadır. Burada doğrudan edinilen deneyime, asistanlık yapılan ders sayısından ziyade öğretim deneyiminin daha çok katkı sağlaması önemli bir bulgudur. Ders sayısı sadece nicelik belirten bir değişkenken, bu derslerde ne sıklıkta öğretime dair etkinliklerin deneyimlendiğini gösteren öğretim deneyiminin doğrudan deneyime katkıda daha etkili olması beklenir. Sonuçlara genel olarak bakıldığında, öğretimdeki başarılı olarak yorumlanan deneyimler ve öğretime atfedilen değer arttıkça, öğretime yönelik özyeterlik de artmaktadır.

Model değişkenleri arasındaki dolaylı etkileri incelemek için bootstrap yöntemi kullanılmıştır (Byrne, 2001). Tüm doğrudan, dolaylı ve toplam etki değerleri Tablo 4.4'te verilmiştir. Öğretime atfedilen değer aracılığında, bölümün öğretim desteğinin (β = .08), öğretim deneyiminin (β = .40), asistanlık yapılan ders sayısının (β = .10) ve doğrudan edinilen deneyimin (β = .26), öğretime yönelik özyeterliği yordamada anlamlı bir dolaylı etkiye sahip olduğu bulunmuştur.

4. TARTIŞMA

Bu çalışmanın amacı, araştırma görevlilerinin üniversitede öğretime yönelik özyeterliği, öğretim üyelerinin kendilerine sağladığı destek, bölümün öğretime yönelik desteği, araştırma görevlilerinin öğretim deneyimi, asistanlık yaptıkları ders sayısı, doğrudan deneyimleri ve üniversitede öğretime verdikleri değer arasında istatistiksel bir model test etmektir. Bu amaç doğrultusunda, Araştırma Görevlilerinin Öğretime Yönelik Özyeterliği Ölçeği (GTA Teaching Self-Efficacy Scale; DeChenne, 2010) Türkçe'ye uyarlanmış ve geçerliği test edilmiştir. Çalışma bulguları, adapte edilen ölçeğin fen, teknoloji, matematik ve mühendislik bölümü araştırma görevlilerinin öğretime yönelik özyeterliğini ölçmede geçerli ve güvenilir sonuç verdiğini göstermiştir. Ayrıca orijinal ölçekte olduğu gibi, adapte edilen versiyon için de, yeterli düzeyde güvenirlik katsayılarına sahip, iki faktörlü yapı sağlanmıştır.

Betimleyici istatistik sonuçlarına göre, Araştırma Görevlilerinin Öğretime Yönelik Özyeterliği Ölçeği'nin iki boyutu arasında az bir fark bulunmuştur.

Araştırma görevlilerinin öğretim ortamını düzenlemeye ilişkin öğretim aktivitelerine yönelik özyeterliklerinin ortalaması, öğretim stratejilerine ilişkin öğretim aktivelerine yönelik özyeterlik ortalamasına göre göreceli olarak fazladır. Katılımcılar, bölümden aldıkları öğretim desteğinin rol model olarak gördükleri ya da yakın çalıştıkları öğretim üyesinin bu yöndeki desteğinden daha fazla olduğunu belirtmiştir. Araştırmada kullanılan ölçeklerin 5'li skala olduğu göz önünde bulundurulduğunda, doğrudan deneyim, öğretim deneyimi ve üniversitede öğretime verilen değer değişkenleri ortalamalarının olumlu yönde olduğu görülmüştür. Katılımcıların öğretim profiline bakıldığında, üniversitede öğretime yönelik eğitim almış araştırma görevlilerinin bu eğitimi almayanlara göre çoğunlukta olduğu bulunmuştur.

Yapısal Eşitlik Modeli ile orta düzeyde uyum istatistikleri ve değişkenler arası anlamlı ilişki bulunmuştur. Test edilen model, çalışmanın ana değişkeni olan öğretime yönelik özyeterlikteki varyansın %72'sini açıklamıştır. Değişkenler arasında, üniversitede öğretime verilen değer ve doğrudan deneyimler özyeterlikle direkt ilişkili iken, bölümün öğretim desteği, deneyim ve asistanlık yapılan ders sayısı dolaylı olarak özyeterliğe etki etmektedir. Çalışmanın ilgi çekici bir sonucu, araştırma görevlisinin yakın çalıştığı ya da rol model olarak gördüğü öğretim üyesinin yaklaşımı ve araştırma görevlisine verdiği öğretim desteğinin doğrudan veya dolaylı hiçbir şekilde öğretime yönelik özyeterliğine etki etmemesidir.

Model analizi ile doğrudan deneyim ve üniversitede öğretime verilen değerin öğretime yönelik özyeterliği anlamlı olarak yordadığı sonucuna ulaşılmıştır. Özyeterliğin dört kaynağı (doğrudan yaşantılar, dolaylı

yaşantılar, sözel ikna, fizyolojik ve duygusal durumlar) arasında, doğrudan yaşantılar en güçlü olanıdır. Yeterli düzeyde doğrudan deneyim edinildiğinde diğer kaynakların etkisi zayıflar (Bandura, 1997). Öğretmenler öğretim deneyimlerini yorumlayarak bu konuda anlayış geliştirirler ve performansları hakkındaki görüşleri daha sonraki deneyimlerini de etkiler. Öğretim performansının başarısız olarak yorumlanması, öğretime yönelik özyeterliği azaltır (Tschannen-Moran ve Hoy, 2007). Öğretim deneyiminin bilişsel süreci ya da bu deneyimlerin yorumlanması, diğer bir deyişle öğretim işinin analizi, özyeterlik kaynaklarının bu inanca olan etkisini de belirler (Tschannen-Moran ve diğerleri, 1998).

Bu çalışmada, model değişkenleri ile ilişkili olan ve dikkat çekici sonuçlar sunan diğer bir değişken ise üniversitede öğretime verilen değerdir. Üniversitede öğretime verilen değer, araştırma görevlilerinin öğretime yönelik özyeterliğindeki varyansın büyük bir oranını açıklamıştır. Dahası, bu değişken öğretim deneyimi, doğrudan yaşantılar ve asistanlık yapılan ders sayısının öğretime yönelik özyeterlik üzerindeki dolayı etkisinde de rol oynar. Beklenti Değer Teorisi ve motivasyon üzerine alan yazında yer alan *değer* değişkeni, öğrenci başarısının yordayıcıları üzerine yapılan çalışmaların odağındadır. Özyeterlik inancı ve değer arasındaki ilişki teorik olarak tanımlanmıştır. Eccles ve arkadaşlarının (1983) Beklenti Değer Teorisi'ne göre kişinin kendi becerilerine dair tanımı belirli işlere atfettiği değer ile doğrudan ilişkilidir. Epstein (1973) ise bireylerin kendilerine güvendikleri aktiviteleri önemli gördüğünü ileri sürmüştür. Her iki kuramcı da, bir işe dair özyeterlik inancının o işi gerçekleştirmeye atfedilen değerle ilişkili olduğunu ortaya koyar.

Bölümün öğretim desteği, öğretime verilen değerle anlamlı olarak ilişkili olmasına rağmen öğretime yönelik özyeterliği yordamamaktadır. Ancak bu ilişki sayesinde, araştırma görevlisinin öğretime verdiği değer bölümün öğretim desteğinin öğretime yönelik özyeterliğe dolaylı etkisinde rol oynar. Çalışmada kullanılan Bölümün Öğretim Desteği Ölçeği'ndeki maddeler, öğretimde yeni fikirlerin uygulanması için araştırma görevlilerini cesaretlendirme, onlara öğretim kaynağı desteği sunma ve farklı öğretim aktivitelerini deneyimlemeye teşvik gibi ifadeleri içermektedir. Prosser ve Trigwell (1999), bölümün öğretim, akademik iş yükü ve sınıf yönetimine yönelik desteğinin öğretim elemanlarını motive etmede kritik faktörler olduğunu öne sürer. Araştırma görevlileri ise sınıf yönetimi, ders planlama ve öğrenci performansını değerlendirme de farklı zorluklar yaşamaktadır. Bölümün öğretime yönelik cesaretlendirme ve desteği, olumlu bir ortamın oluşmasını sağlar. Böyle bir ortamda çalışan araştırma görevlilerinin, öğretime yönelik motivasyonunun da yüksek olması beklenir. İlk ve orta öğretim düzeyinde öğretime yönelik özyeterlik çalışan araştımacılar da örgütsel desteği göz önünde bulundurarak, okul ortamının öğretime yönelik özyeterliğe etkisini fark etmişlerdir. Chester ve Beaudin (1996)'a göre, okullar pozitif ortam oluşturarak ve öğretmenler arasındaki iş birliğini danışmanık ve sağladıkları kaynaklarla arttırarak öğretime yönelik özyeterliği etkileme gücüne sahiptirler. Öğretime yönelik özyeterlik, örgütsel destek ve öğretime bağlılıkla çok güçlü bir ilişki içindedir (Coladarci, 1992). Performansa yönelik geri bildirimin sağlandığı ve fikirlerin paylaşıldığı destekleyici bir ortam, öğretime bağlılığı da katkı sağlamakta, öğretime bağlılığı artan öğretmenlerin öğretime yönelik özyeterlikleri de artmaktadır (Evans ve Tribble, 1986).

Doğrudan yaşantıların, araştırma görevlisinin asistanlık yaptığı ders sayısı ve öğretim deneyimi ile anlamlı bir şekilde ilişkili olduğu bulunmuştur. Öğretim deneyiminin doğrudan deneyime olan katkısının, asistanlık yapılan ders sayına göre daha fazla olarak bulunması dikkat çekicidir. Öğretim deneyimi, farklı öğretim aktivitelerinin gerçekleştirilme sıklığını ifade ederken, asistanlık yapılan ders sayısı sadece nicel bir değişken olarak alınmıştır. Bu bulgu, öğretim performansının nasıl yorumlandığının öğretime dair nicel bir değişkenden daha önemli olduğunu göstermiştir. Prieto ve Altmaier (1994)'in bulguları da öğretim deneyiminin araştırma görevlilerinin özyeterliğini açıklamada anlamlı bir yordayıcı olduğuna işaret etmiştir. Ancak bu çalışmada deneyim, asistanlık yapılan ders sayısı olarak alınmıştır. Prieto ve arkadaşları (2007) tarafından yapılan başka bir çalışma ise, farklı öğretim rollerine (örn. notlandırma ve laboratuar asistanlığı) göre öğretime yönelik özyeterliğin değiştiği sonucuna ulaşmıştır. Laboratuar asistanlığı yapan araştırma görevlilerinin, öğretim görevi olmayan meslektaşlarına göre daha yüksek özyeterliğe sahip olduğu bulunmuştur. Bu da ders asistanı olarak alınan sorumluluğun süreye göre daha önemli olduğuna işaret etmektedir.

Anlamlı sonuçlara karşın, öğretim üyesinin desteği ve öğretim yaklaşımının araştırma görevlisinin özyeterliği üzerinde dolaylı ve doğrudan bir etkisi bulunmamıştır. Öğretim Üyesi Desteği Ölçeği'nin bu boyutları rol model alınan öğretim üyesinin danışmanlığını, desteğini ve öğretim deneyimlerine dair araştırma görevlisinin gözlemlerini ölçen maddeler içermesine rağmen, ölçeğin faktörlerinin herhangi bir etkisinin bulunmaması şaşırtıcıdır. Prieto ve Meyers (1999)'in psikoloji bölümü araştırma görevlileriyle yaptığı çalışmada, danışmanlığın öğretime yönelik özyeterliğe katkı sağladığı

bulunmuştur. Danışmanlık, öğretim becerilerinin gelişmesi için anlamlı bir değişkendir (Bomotti, 1994; Smith, 1993). Prieto ve Meyers (1999) ise danışmanlığın kalitesinin ve araştırma görevlisi tarafından nasıl algılandığının da araştırılması gerektiğini vurgulamıştır. Ayrıca danışmanlığın özyeterliğe olan etkisi üzerinde fikir birliğine varabilmek için başka çalışmaların da yapılması gerektiğini belirtmişlerdir. Öğretime yönelik özyeterlik alan yazınında, başkalarının öğretim deneyimlerini gözlemlemenin özyeterlik inancı geliştirmede rolü olduğu belirtilmiştir (Bandura, 1997). Bazı araştırmacılar ise bu duruma zıt bulgular sunmuştur. Örneğin, Poulou (2007) hizmet öncesi öğretmenlerin özyeterlik kaynaklarını incelemiş ve dolaylı yaşantıların öğretime yönelik özyeterliğin hiçbir boyutu için, öğretim stratejilerine yönelik, sınıf yönetimine yönelik, öğrenci katılımına yönelik, etkili olmadığı sonucuna ulaşmıştır. Benzer şekilde Morris (2010), K-12 düzeyinde çalışan öğretmenlerle yaptığı çalışmasında, dolaylı deneyimlerin öğretime yönelik özyeterlikteki varyansa katkısını (%0.8) çok düşük olarak raporlamıştır. Birbirine karşıt sonuçların bulunma nedeni Pajares ve Usher (2008)'a göre dolaylı deneyimleri ölçmedeki zorluktan kaynaklanmaktadır.

Öğretim üyesi desteği ve bölümün öğretim desteği dışşında, diğer model değişkenlerinin ana değişken olan öğretime yönelik özyeterlik ile ilişkisi beklendiği gibi çıkmıştır. Dolaylı deneyim olarak, öğretim üyesinin öğretim deneyiminin öğretime yönelik özyeterliğin güçlü yordayıcılarından olacağı düşünülmüştür. Ancak Pajares ve Usher (2008)'ın da belirttiği gibi dolaylı yaşantılar ölçülmesi zor bir değişkendir. Bölümün öğretim desteği, çalışmanın başında model geliştirilirken özyeterlik kaynaklarından biri, sözel ikna, olarak düşünülmüştür. Öğretim üyesi desteğinden farklı olarak, en

azından öğretime yönelik özyeterliğe dolaylı olarak etki ettiği sonucuna ulaşılmıştır. Bu sonuçlar göz önünde bulundurulduğında, bölümün araştırma görevlisinin özyeterliğine etkisinin tek bir öğretim üyesinin, araştırma görevlisi için bir rol model olsa ya da onunla yakın çalışmış olsa da, etkisine göre daha fazla olduğunu söylemek mümkündür.

4.1 Uygulamaya Yönelik Öneriler

Bu çalışmada Araştırma Görevlileri Öğretime Yönelik Özyeterlik Ölçeği, tatmin edici psikometrik sonuçlarla Türkçe'ye adapte edilmiştir. Araştırma görevlilerinin öğretime yönelik özyeterliklerini ölçmek, özyeterliğin kestirimci doğası gereği önemlidir (Bandura, 2006). Yani kişinin bir işe yönelik yeterlik inancı, onun ileride bu işte nasıl bir performans göstereceğinin de göstergesidir. Dahası Bandura (1997) özyeterliğin işe özel bir değişken olduğunu ileri sürmüştür. Bu nedenle, üniversite düzeyinde öğretime yönelik özyeterliğin ölçülmesi için ayrı bir ölçek gerekmektedir. Bu çalışma da Türkçe alanyazındaki, üniversitede öğretime yönelik özyeterliği ölçme aracına olan ihtiyacı karşılamaktadır. Bu ölçeğe ek olarak, Özyeterlik Kaynakları Ölçeği'nin *doğrudan deneyim* alt boyutu FTMM araştırma görevlilerine uyarlanmıştır. Bu ölçek daha önce Çapa-Aydın, Uzuntiryaki-Kondakçı**,** Temli ve Tarkın (2013) tarafından Türkçe'ye adapte edilmiş, ancak hizmet öncesi öğretmenler için kullanılmıştır. Ölçeğin 8 maddelik alt boyutu ile araştırma görevlilerinin üniversitedeki doğrudan deneyimleri ölçülmüştür.

Bu çalışmanın asıl amacı, araştırma görevlilerinin öğretime yönelik özyeterliğini yordayan değişkenleri incelemektir. Bulgular, doğrudan

deneyim ve üniversitede öğretime atfedilen değerin öğretime yönelik özyeterlikteki varyansı açıkladığını göstermiştir. Ayrıca, öğretim üyesinin desteği yerine bölümün öğretim desteği anlamlı bir değişken olarak bulunmuştur. Bu faktörler, araştırma görevlilerine öğretimi deneyimleme fırsatı sunma ve kendi deneyimleri üzerine eleştirilerini incelemenin bir ihtiyaç olduğunu göstermektedir. Mikro öğretim, araştırma görevlilerinin performansını gözlemlemek, performanslarını değerlendirmelerine imkan sunmak ve onlara geri bildirimde bulunmak için yararlı bir tekniktir (Millis ve Samojlowicz, 2007). Ayrıca, öğretim üyelerini ve araştırma görevlilerini biraraya getirerek tartışma ortamı sağladığından, çalıştay ve öğretim üzerine periyodik toplantılar olumlu bir öğretim atmosferi geliştirebilir.

Çalışma bulguları, asistanlık yapılan ders sayısının ve öğretim deneyiminin, dolaylı deneyimler aracılığı ile öğretime yönelik özyeterliğe etki ettiğini göstermiştir. Bu sonuç, araştırma görevlisinin ne sıklıkta farklı öğretim aktivitesi gerçekleştirdiğinin önemli olduğunu vurgulamaktadır. Öğretime dair (örn. ölçme değerlendirme, öğrencilerle iletişim ve öğretim teknikleri) araştırma görevlilerine verilecek eğitimler onların performanslarını geliştirecektir. Dahası, bölümün öğretime yönelik desteği, öğretime atfedilen değerin aracılığı ile öğretime yönelik özyeterliğe etki etmektedir. Bölümün öğretimde yeni metodları denemeye ve seminerlere katılmaya yönelik teşvik, araştırma görevlilerine öğretim materyali vb. konularda desteği, onların öğretime verdiği değeri arttıracak bu da öğretime yönelik yüksek bir özyeterlik düzeyi sağlayacaktır. Bölümlerde yapılan paylaşım toplantılarına, diğer bölüm ve üniversitelerin öğretimde başarılı olan öğretim üyeleri de davet edilebilir.

4.2 Araştırmaya Yönelik Öneriler

Çalışmada adapte edilen Araştırma Görevlilerinin Öğretime Yönelik Özyeterliği Ölçeği, fen, teknoloji, matematik ve mühendislik alanlarında çalışan araştıma görevlileri için geliştirilmiştir. Araştırma görevlilerinin öğretim deneyimleri disiplinlere göre değişebileceğinden, bu ölçeğin sosyal bilimler bölümlerinde öğrenim gören araştırma görevlileri için de uyarlanması gerekmektedir. Daha sonraki çalışmalarda, fen ve sosyal bilimlerde çalışan araştırma görevlilerinin öğretime yönelik özyeterliklerinin karşılaştırması üzerine odaklanılabilir.

Çalışma sonuçları, araştırma görevlilerinin öğretime yönelik özyeterliğindeki varyansın büyük bir bölümünün (%72) modelde test edilen değişkenler tarafından açıklandığını göstermiştir. Bu modelde test edilen özyeterlik kaynakları ise, doğrudan deneyimler ve dolaylı deneyimlerdir (öğretim üyesinin ve bölümün öğretim desteği). Ancak modelde incelenmeyen iki özyeterlik kaynağı, sözel ikna ile fiziksel ve duygusal durum, daha vardır. Bu kaynaklar ve bunları etkilediği literatürde desteklenen faktörler sonraki çalışmalarda incelenebilir. Bu bağlamda, akranların desteği, stres ve endişe düzeyi ve farklı duygusal durumlar öğretime yönelik özyeterliğin yordayıcıları olarak araştırılabilir. Bu çalışmaların sonuçları, öğretime yönelik özyeterlik ile ilişkili faktörler üzerine Türkçe alanyazınına da katkı sağlayacaktır.

Araştırma verileri, URAP 2013 listesinde ilk ona giren ve Ankara'da bulunan dört devlet üniversitesinin fen ve mühendislik fakültelerindeki araştırma görevlilerinden toplanmıştır. İlk onda olmayan ünivesitelere göre, seçilmiş

olan bu dört üniversite çalışma ortamları, öğretim kaynakları ve yayın sayısına dayalı başarı düzeyleri açısından benzer özellikler taşımaktadır. Ancak bu faktörlerin, öğretime yönelik özyeterlik ve ilişkili değişkenler üzerinde etkisi olabilir. Gelecek çalışmalar için bu değişkenler açısından farklılık gösteren üniversitelerden veri toplanması önerilebilir.

Çalışmada değişkenler arası ilişki bakıldığından değişkenlerde süreç içinde meydana gelebilecek farklılıklar göz önünde bulundurulmamıştır. Daha sonraki çalışmalarda, boylamsal olarak tasarlanan araştırma süreçleri ile öğretime yönelik özyeterlikte zamanla meydana gelebilecek değişiklikleri de incelemek mümkün olabilir. Ayrıca, nitel tekniklerin kullanılacağı çalışmalar araştırma görevlilerinin öğretim performanslarını gözlemlemek, onlarla görüşme yapmak ve odak grup çalışmalarında bulunmak için yararlı olacaktır.

Çalışmada ilişkisel araştırma deseni kullanılarak istatistiksel bir model test edilmiştir. Öte yandan, deneysel olarak tasarlanacak ilerleyen çalışmalarla, araştırma görevlilerinin öğretime yönelik özyeterliğiyle ilişkili değişkenlerin sebep sonuç ilişkisi içinde incelenmesi mümkün olacaktır.

D. CURRICULUM VITAE

PERSONAL INFORMATION

Surname, Name: Ceylandag, Rana
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EDUCATION

Degree	Institution	Year of Graduation
MS	METU Educational Sciences	2009
BS	Bogazici University, Science Teaching	2006
High School	Samsun Anadolu High School, Samsun	2002

WORK EXPERIENCE

Year	Place	Enrollment
Feb 2014- Aug 2014	Tohum Autism Foundation	Project Specialist
2007- 2014	METU Department of Educational Sciences	Research Assistant

FOREIGN LANGUAGES

Advanced English

PUBLICATIONS

Papers (International):

1. Uzuntiryaki, E., Capa Aydın, Y., Ceylandag, R., and Comert, G., (2011, September). Sources of high school students' self-efficacy beliefs in chemistry. Paper presented at European Conference on Educational Research, Freie University, Berlin, GERMANY.

Papers (National):

2. Ceylandag, R., Cihan, T., Kasapoglu, K., Kocer, E., & Ozbek, G. (2012, September). Analysis of curriculum and instruction M.Sc. program in the department of educational sciences at a university. Paper presented at Applied Education Congress, METU, Ankara, TURKEY.

3. Ceylandag, R., Dolunay, F., Ozbek, G., Tanrikulu, I., Topcu, C., Turan, N. & Capa-Aydın, Y. (2012, September). Academic and non academic needs of graduate students. Paper presented at Applied Education Congress, METU, Ankara, TURKEY.

4. Ceylandag, R., Dolunay, F. & Barutcu, F. (2012, September). Communication in academic context and job satisfaction: Research assistants' perspective. Paper presented at Applied Education Congress, METU, Ankara, TURKEY.

5. Ceylandag, R. (2012, May). School architecture: Experiences or milieu in education? Paper presented at National Education Sociology Symposium I, Ankara University, Ankara, TURKEY.

6. Ceylandag, R. (2011, October). Developing human rights curriculum for 7th grade through critical thinking approach. Paper presented at Values Education Symposium, Osmangazi University, Eskisehir, TURKEY.

7. Capa-Aydin, Y., Guclu, A. & Ceylandag, R. (2010, May). *Examining emotion regulation strategies used by upper elementary school students during test taking.* Poster presented at National Congress on Measurement and Evaluation in Education and Psychology II, Ankara University, Ankara, TURKEY.

8. Ceylandag, R. (2008 ,May). *Developing teachers' self-efficacy toward measurement and evaluation practices scale.* Paper presented at National Congress on Measurement and Evaluation in Education and Psychology I, Ankara University, Ankara, TURKEY.

HOBBIES

Music

E. TEZ FOTOKOPİSİ İZİN FORMU

ENSTİTÜ

Fen Bilimleri Enstitüsü [ ]

Sosyal Bilimler Enstitüsü [X]

Uygulamalı Matematik Enstitüsü [ ]

Enformatik Enstitüsü [ ]

Deniz Bilimleri Enstitüsü [ ]

YAZARIN

Soyadı : CEYLANDAĞ

Adı : RANA

Bölümü : EĞİTİM BİLİMLERİ

TEZİN ADI (İngilizce) : FACTORS INFLUENCING COLLEGE TEACHING SELF-EFFICACY OF SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS GRADUATE TEACHING ASSISTANTS

TEZİN TÜRÜ : Yüksek Lisans [ ] Doktora [X]

1. Tezimin tamamı dünya çapında erişime açılsın ve kaynak gösterilmek şartıyla tezimin bir kısmı veya tamamının fotokopisi alınsın. [ ]

2. Tezimin tamamı yalnızca Orta Doğu Teknik Üniversitesi kullancılarının erişimine açılsın. (Bu seçenekle tezinizin fotokopisi ya da elektronik kopyası Kütüphane aracılığı ile ODTÜ dışına dağıtılmayacaktır.) [ ]

3. Tezim bir (1) yıl süreyle erişime kapalı olsun. (Bu seçenekle tezinizin fotokopisi ya da elektronik kopyası Kütüphane aracılığı ile ODTÜ dışına dağıtılmayacaktır.) [X]

Yazarın imzası ..... Tarih .....