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Teacher Self-Efficacy and Individual Academic Optimism as Predictors of Teacher Professional Learning: A Structural Equation Modeling

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Abstract

The purpose of this study is to investigate the relationship between teacher self-efficacy, individual academic optimism and teacher professional learning. A total of 300 teachers employed in primary and secondary schools located in the center of Karabuk province participated in this quantitative study designed as correlational research. The data of the current study were gathered through the Teacher Professional Learning Scale, Teacher Self-Efficacy Scale and Academic Optimism of Individual Teacher Scale. A Pearson Product Moment Correlation Coefficient was calculated to detect the relationships among variables of the study, and a path analysis was performed to indicate the direct predictive power of teacher self-efficacy on individual academic optimism and teacher professional learning, the direct predictive power of individual academic optimism on teacher professional learning and also the indirect predictive power of teacher self-efficacy on teacher professional learning through individual academic optimism. Results revealed that the dependent and independent variables of the study correlated to each other positively and significantly, and that teacher self-efficacy predicted individual academic optimism and teacher professional learning positively and significantly, and also that individual academic optimism predicted teacher professional learning positively and significantly. Finally, results illustrated that individual academic optimism predicted positively and indirectly teacher professional learning through individual academic optimism. The results of the current study supported the conceptual model built on the relationship between teacher self-efficacy, individual academic optimism, and teacher professional learning, the three being crucial for teacher development.

Keywords

Teacher professional learning
Individual academic optimism
Teacher self-efficacy
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Introduction

Recent years have witnessed research that specifically focuses on the relationship between teacher training and its quality and the quality of teaching conducted in the school and teacher professional learning (Liu, Hallinger, & Feng, 2016; Hallinger, Piyaman, & Viseshsiri, 2017; Lunenberg, Murray, Smith, & Vanderlinde, 2016). Other research illustrates the significant effects of teacher professional learning practices on achieving pedagogical goals (Boyd, Harris, & Murray; 2011; Hallinger, Liu, & Piyaman, 2019; Kosnik et al., 2011). It states that qualified human resources are an important potential power. Only a well-structured and professional team can provide training to realize this power (Darling-Hammond, 2017). In this context, one can say that the different educational reforms carried out in many countries are adaptations to the rapidly changing world (Hallinger et al., 2017). Therefore, countries need teachers who gain new knowledge, skills and perspectives that keep up to date and even prepare students for future possibilities (Vescio, Ross, & Adams, 2008). Researchers have stated that the professional development of teachers is one of the most influential factors on student achievement and learning (Li, Hallinger, & Ko, 2016; Liu et al., 2016; Liu & Hallinger, 2018). Teacher education has become a lifelong learning approach for the professionalization of teachers, beyond practice teaching and study undertaken before starting the profession (Timperley, 2011).

There are significant differences between traditional teacher competencies and teacher competencies in the understanding of contemporary teachers. There are differences between the level of knowledge, skills, and competence required for teachers in the past, and those required today because contemporary pedagogical and technological developments diversify and change teacher roles. Current debates on teacher professional development suggest that professional development is crucial for teacher quality (Mockler, 2011; Sachs, 2016). In this regard, some researchers point out that teacher professionalism should be tied to current developments (Golob, 2012; Livingston, 2016). The professional learning networks created by teachers, continuous professional development supported by positive school climate and supportive school leadership were effective in the success of the Singapore education system. It has received substantial international attention with its success in international assessment exams (Hairon & Dimmock, 2011). Similarly, learning networks, collaboration among colleagues, informal communication networks, collaboration with universities and supportive school environments affect the academic success of students (Akiba & Liang, 2016; MacDonald, Wise, Riggall, & Brown, 2019).

Sustainable progress in education is made possible by the development of the school culture and by the continuous professional and intellectual learning of teachers (Thoonen, Sleegers, Oort, & Peetsma, 2012). As teachers solve the problems they encounter throughout their careers, they become professionally competent. Professional learning based on collaboration among colleagues is important in solving the problems experienced by inexperienced teachers in the profession (De Neve, Devos, & Tuytens, 2015). Research shows that strong school culture, professional learning behavior of teachers, school engagement, organizational citizenship behavior, peer-to-peer cooperation, and learning-development experiences are effective in the professional development of teachers (Moolenaar, Sleegers, & Alan, 2011; Thoonen et al., 2012). Professional development opportunities offered to teachers under the leadership of school administration and educational activities that enable collaboration between colleagues create meaningful and permanent influences on students' learning behavior (Darling-Hammond & Richardson, 2009). Professional learning allows for the activation of energy gained by combining teachers' skills and competencies (Senge, 2014). Furthermore, it has been revealed in various studies that effective teaching skills contribute positively to teacher attitudes, beliefs and the quality of teaching activities (Acker, 1999; Day, Kington, Stobart, & Sammons, 2006; Guskey, 2002; Kelchtermans & Vanderberghe, 1994; Sumsion, 2002). Almost all of the above-mentioned factors on the professional development of teachers are possible by making teachers' continuous learning behavior, the basic life philosophy and a professional principle (Doddilet, Lundin, & Krüger, 2019; Nicholls, 2000).

The purpose of the present study, then, is to reveal the effects of teacher self-efficacy and individual academic optimism on teacher professional learning. Research shows that teacher self-efficacy and collective teacher efficacy affect teachers' collaboration and participation in the professional learning process (Liu & Hallinger, 2018; Kwakman, 2003; Leithwood & Jantzi, 2008). It has also been revealed in a line of studies that teacher self-efficacy is positively associated with teacher professional learning (De Neve et al., 2015; Liu & Hallinger, 2018). On the other hand, there exists evidence that cooperative teacher learning affects teacher self-efficacy, optimism, loyalty, and harmony among teachers (Bogler & Somech, 2004; Goddard, Goddard, & Tschannen-Moran, 2007; Hall & Trespalacios, 2019; McGuigan & Hoy, 2006). There are also studies showing that individual academic optimism, which is the mediating variable of the current study, affects teacher performance, collaboration among teachers and student success. Besides, teacher academic optimism contributes significantly to student success and teacher motivation (Harris, Mascall, Leithwood, Straus, & Sacks, 2008). However, the literature lacks solid evidence considering the mediating role of individual academic optimism in the effect of teacher self-efficacy on teacher professional learning.

It is clear that the centralized management approach in the Turkish Education System is reflected on the school level (Beycioğlu, Kılınç, & Polatcan, 2019; Recepoğlu & Kılınç, 2014). Although there are efforts to improve teacher self-efficacy and to strengthen teacher professional learning at the policy level, it is clear that these efforts are likely to take a long time to be implemented (MoNE, 2019). In fact, TALIS report reveals that the efforts on developing teacher competencies are limited and that the cooperation between teachers is weak (OECD, 2019). This study focuses on determining the extent to which teacher self-efficacy affects teachers' professional learning and the role of individual academic optimism in this effect. In other words, this study aims at revealing the importance of teacher self-efficacy and individual academic optimism to strengthen teacher professional learning. Furthermore, the present study represents a scholarly effort to gain a new perspective on effective school research by expanding the research ground on teacher professional learning.

Research Question 1: What is the relationship between teacher professional learning, individual academic optimism, and teacher self-efficacy?

Research Question 1: Does the teacher self-efficacy predict teacher professional learning and individual academic optimism?

Research Question 1: Does individual academic optimism mediate the effect of teacher self-efficacy on teacher professional learning?

Theoretical Perspective

This section discusses the theoretical grounds of the research variables. Then, the focus is on the theoretical relationships between teacher self-efficacy, individual academic optimism, and teacher professional learning. The last part highlights the theoretical foundations of the mediating role of individual optimism between teacher self-efficacy and teacher professional learning.

Teacher Professional Learning

Teaching is a profession that requires a series of competences and expertise along with both field knowledge and professional formation (Bouley et al., 2015). People are at the center of teaching. Therefore, in order to obtain a good teacher identity, those who are candidates for the profession and those who are currently practicing the profession are expected to be aware of the equipment and competencies required by the profession and continue this awareness throughout life (Forte & Flores, 2014; Korthagen, 2017). Past research also reveals that teachers' development of their professional knowledge and skills is regarded as a form of adult learning (Yoon et al., 2007). At this point, Mockler (2020) states that teacher professional learning has been the subject of educational research for a long time, and the concept has been identified with in-service training as an opportunity for professional development in the past. However, Mockler states that since the 2000s, teacher professional learning

has been treated as a set of more active, collaborative, inquiry-based professional learning activities. Given this, the present study treats teacher professional learning as a life-long process and within the framework of all the achievements that the teacher has gained in the professional sense during his career.

One of the important purposes of teacher professional learning is to leverage student success (Hallinger et al., 2019; Leithwood, Jantzi, & Hopkins, 2006; Sleegers, Bolhuis, & Geijsel, 2005). The way the teacher organizes teaching, encouragement of students to participate in the learning process and cultural understanding of the society in which the teacher works, shapes the professional learning of the teacher (Timperley, Wilson, Barrar, & Fung, 2008). Teacher professional learning is a concept related to the development of teachers' knowledge and practices (Nolan & Molla, 2018). Teacher professional learning refers to the collective efficacy of teachers that develop formal and informal learning experiences, and professional practices of teachers and have an impact on student learning (Lloyd & Davis, 2018). More specifically, teacher professional learning is often associated with the development and diversification of classroom activities, making the learning climate effective and enriching students' learning actions (Borko, 2004). Teacher professional learning includes the formal and informal learning of teachers, the research and development groups they have created to make effective in-school teaching practices, peer collaboration and learning from peers (Little, 2012; Timperley, 2011). Thoonen, Sleegers, Oort, Peetsma, & Geijsel (2011) have written that the profile of learning school, which emerged with the positive school climate and effective leadership provided by the school administration, supports teacher professional learning. Furthermore, Walker (2007) highlights school structure, school values, and peer-to-peer relationships among the factors that may affect teachers' engagement in professional learning. Consequently, teacher professional learning refers to a dynamic process that solves the problems of the teacher's practices, develops collaboration among colleagues, encourages teachers to try new practices, and shapes and directs teachers' own learning (Hallinger et al., 2017; Kwakman, 2003; Koffeman & Snoek, 2019; Mockler, 2020).

This study is guided by the conceptualization with respect to teacher professional learning developed by Liu et al. (2016). Therefore, the concept has included four dimensions. The first is collaboration which denotes to teachers' working together with colleagues to build and practice pedagogical activities, to share their experiences, and to communicate on curriculum and instructional methods with colleagues. The second dimension is reflection, which denotes teachers' evaluating themselves through their own experiences and classroom practices that they have built and their efforts exerted to eliminate deficiencies. This dimension also addresses to teacher's dominating the knowledge base related to her/her field by making use of student responses in the classroom and to modeling the best practices of colleagues to improve teaching. The third dimension is conceptualized as experimentation. This dimension includes being open to accepting and using recent instructional methods and ideas and utilizing new instructional materials. The last dimension of the construct is defined as reaching out to the knowledge base aiming to assess the extent to which teachers have exerted efforts to learn from various sources such as student feedback and observation of colleagues.

Individual Academic Optimism

Academic optimism, which is one of the concepts of positive psychology, focuses on the positive feelings of people in areas where they can improve themselves (Seligman, 2002). Academic optimism is one of the concepts that shape teachers' cognitions for the high level of activities and academic studies in the classroom (Hoy, Tarter, & Woolfolk Hoy, 2006). Academic optimism is defined as the positive beliefs that teachers have denoting that they can positively affect students' academic performance through the teaching practices they develop and apply (Woolfolk Hoy, Hoy, & Kurz, 2008). These beliefs include emphasizing the strong learning aspects of students, trusting in and cooperating with the families, being aware of the capacity of the students and of their ability to overcome difficulties, and teaching students to cooperate and collaborate (McGuigan, 2005; Ngidi, 2011).

Teacher beliefs and attitudes have a significant effect on teacher roles. Teacher beliefs are reflected in teaching practices and other attitudes towards the task (Anwar & Anis-ul-Haque, 2014). In this study, academic optimism is considered as a theoretical structure consisting of three components entitled teacher self-efficacy, sense of trust and academic emphasis (Beard, Hoy, & Woolfolk Hoy, 2009; Smith & Hoy, 2007). Teacher self-efficacy is a belief that teachers can positively affect student achievement (Boonen, Pinxten, Van-Damme, & Onghena, 2014). Academic emphasis refers to being focused on success and to evaluating students' works rigorously to maximize their academic performance (Goddard, Sweetland, & Hoy, 2000). The third component expresses teachers' trust in students and their families. Hoy and Tschannen-Moran (1999) express the trust between students and families as being mutually honest and being transparent to each other. On the other hand, Beard et al. (2009) suggest that academic optimism in schools has cognitive, affective and behavioral components. These components refer to collective efficacy, teachers' trust, and academic emphasis. Collective efficacy expresses teachers' beliefs with their colleagues towards a positive impact on students. Trust includes teachers' perceptions that students and their families are open, transparent, reliable, and honest. Academic emphasis means students' focus on learning. In several studies, it is seen that academic optimism is reduced to the level of individual teachers and considered and analyzed as a teacher feature (Beard, Hoy, & Woolfolk Hoy, 2010; Woolfolk Hoy et al., 2008; Yalçın, 2012).

Teachers' perspectives on their professional competencies, their pedagogical leadership to students, and their beliefs about making a lasting change in students' performances are related to teachers' academic optimism (Eren, 2012; Goddard et al., 2000; Hoy et al., 2006; Woolfolk Hoy et al., 2008). Previous research evidenced that the academic atmosphere of schools that influences teachers' professional development, and learning contributed to individual academic optimism. This learning resulted in a higher level of teacher commitment to the school and teaching profession (Çoban & Demirtaş, 2011). Other research also revealed that individual academic optimism was positively correlated with teacher professional learning and teacher self-efficacy (Krier, 2014; Kurz, 2006; McGuigan & Hoy, 2006). Furthermore, a group of scholars have suggested that teachers with a strong sense of academic optimism maintain their learning more professionally. These teachers have also made significant contributions to school effectiveness along with the processes such as teacher leadership, collaboration, and solidarity among colleagues (Beard, et al., 2009; Donovan, 2014; Kurz, 2006; Mitchell & Tarter, 2016). It was thus hypothesized in this study that individual academic optimism is positively and significantly correlated with teacher professional learning and that individual academic optimism predicts teacher professional learning positively and significantly.

H_1: Individual academic optimism predicts teacher professional learning significantly.

Teacher Self-efficacy

Self-efficacy, one of the concepts of social cognitive theory, was proposed by Bandura (1993). Teacher self-efficacy is conceptualized as teachers' belief in planning, organizing and carrying out the necessary activities towards educational goals (Skaalvik & Skaalvik, 2009). Bandura (2005) suggests that individuals with a high level of self-efficacy develop high-level success scenarios. However, individuals with low self-efficacy tend to associate themselves with failure scenarios. Besides, research has examined the relationship between teacher self-efficacy and teacher burnout, stress, teacher participation, job satisfaction, and student performance (Egyed & Short, 2006; Schwarzer & Hallum, 2008; Skaalvik & Skaalvik, 2009, 2014). In this study, teacher self-efficacy is conceptualized around three main factors. Among these factors, efficacy for instructional strategies includes the alternative teaching methods used by teachers in the classroom, the way they answer questions from students, the use of

different assessment strategies, and the attempts to direct students to individual learning. Teacher efficacy for classroom management covers the level of teachers' managing undesirable behavior in the classroom and how well they can ensure that students comply with classroom rules. Teacher efficacy for student engagement includes teachers 'efforts to enrich their learning practices, students' critical thinking and the ability to make learning valuable (Tschannen-Moran & Woolfolk Hoy, 2001).

Research has provided evidence that there exists a relationship between teachers 'academic and individual optimism and their self-efficacy, and that this relationship has also been positively reflected in students' academic achievement (Moghari, Lavasani, Bagherian, & Afshari, 2011). Furthermore, some researchers suggest that both the self-efficacy and the academic optimism of teachers affect their hope and zest for work in their teaching activities (Sezgin & Erdoğan, 2015). Research also indicates that teachers who have a strong self-efficacy belief have more positive perceptions of improving teaching, use their capacity more effectively and are more dedicated to the profession (Cheng & Chiou, 2010). Baumeister, Campbell, Krueger, and Vohs (2003) stress that teachers' high level of self-efficacy increases their academic optimism. Furthermore, Kumar and Mohana (2014) reveal that teachers' self-efficacy is positively correlated with academic optimism levels and that self-efficacy predicts teachers' capacity to manage their conditions positively and significantly. Wang, Zhang, and Jackson (2013), on the other hand, proved that teacher self-efficacy is a direct predictor of teachers' psychological empowerment. In this regard, teacher self-efficacy is expected to predict individual academic optimism positively and significantly.

H_2: Teacher self-efficacy predicts teacher individual academic optimism positively and significantly.

In the literature, it is seen that researchers emphasize the concept of self-efficacy in the context of its effect on teacher learning (Evelein, Korthagen, & Brekelmans, 2008; Tschannen-Moran & Woolfolk Hoy, 2001). The strong self-efficacy of teachers can be evaluated as an indication of teachers' beliefs that they have sufficient confidence and knowledge and skills in the process of learning and teaching (Tschannen-Moran & Woolfolk Hoy, 2001). It is also stated that teachers with strong self-efficacy are more competent than their colleagues in developing and applying learning-teaching practices and evaluating their effectiveness (Evelein et al., 2008), and that they feel confident in developing and trying different and effective teaching methods (Bandura, 1993; Özenoğlu Kiremit, 2006; Safran, Safran, & Barcikowski, 1990). Lumpe, Vaughn, Henrikson, and Bishop (2014) suggest that teacher self-efficacy constitutes an important part of the teacher professional learning process, and that teachers' beliefs and practices towards continuous development play a critical role in student learning and school effectiveness.

There exists research evidence that teacher self-efficacy is effective in teaching effectiveness, student motivation and success, and school development (Ashton, 1985; Liu & Hallinger, 2018; Tschannen-Moran & Wolfolk Hoy, 2001; Wheatley, 2002; Zheng, Yin, & Li, 2018). Research findings show that teachers with strong self-efficacy beliefs are more optimistic, eager and willing to try different and effective teaching methods in instructional practices (Guskey, 1988). Also, it is stated that teachers with high self-efficacy beliefs tend to participate more in school decision-making processes (Allinder, 1994), use a more constructive language when students make mistakes (Ashton & Webb, 1986) and benefit from the experiences of other teachers in their professional learning process (Basom & Frase, 2004; Høigaard, Giske, & Sundsli, 2011). Other studies have also demonstrated that teachers with a strong self-efficacy belief are more willing to continue their professional learning and produce effective

teaching practices (Caprara, Barnabelli, Steca, & Malone, 2006; Lin, Gorrell, & Taylor, 2002). There are also research findings showing that teacher self-efficacy positively affects teachers' attitudes towards learning and their participation in learning processes (Kwakman, 2003; Leithwood & Jantzi, 2008; Liu & Hallinger, 2018). In this regard, teacher self-efficacy is expected to predict teacher professional learning positively and significantly.

H_3: Teacher self-efficacy predicts teacher professional learning positively and significantly.

Some studies detected a relationship between teacher self-efficacy, teacher professional development and learning in the field of educational administration (Lumpe et al., 2014). Furthermore, there are findings suggesting positive correlations between teacher individual and collective academic optimism and teacher self-efficacy (Smith & Hoy, 2007) and teacher professional learning (Krier, 2014; Kurz, 2006). In this regard, the research findings revealing that teachers' individual and collective academic optimism perceptions positively and significantly correlate with both teacher self-efficacy, and teacher professional learning increases the possibility of the emergence of the mediating role of individual academic optimism between these two constructs. We, therefore, expect that individual academic optimism mediates between teacher self-efficacy and teacher professional learning.

H_4: Individual academic optimism acts as a mediator in the prediction of teacher professional learning by teacher self-efficacy.

Conceptual Model

The conceptual model that guided this study is based on previous research findings. In the current study, it is assumed that teacher self-efficacy can have direct and indirect effects on teacher professional learning and that individual academic optimism can act as a potential mediating variable. Although previous scholarship indicated that teacher professional learning is related to their self-efficacy beliefs and perceptions of academic optimism (Lumpe et al., 2014), the literature is short in terms of studies that specifically focus on the mediating role of individual academic optimism in the relationship of teacher self-efficacy and teacher professional learning. Therefore, the findings of the current study fill this gap in the relevant literature. Thus, this study has focused on the relationships between teacher self-efficacy, individual academic optimism, and teacher professional learning. Furthermore, the study has aimed at the predictive power of an independent variable of the study entitled teacher self-efficacy and individual academic optimism on teacher professional learning. Finally, the authors have taken effort to test the indirect predictive power of the independent variable (teacher self-efficacy) on teacher professional learning through individual academic optimism. We hypothesized that the construct of individual academic optimism acts as a mediator between teacher self-efficacy and teacher professional learning, and that it affects the notion that teachers assume themselves as professionals who continue to learn throughout their lives. We suggest that those who produced policies related to teacher professional learning and its development at a macro level, that is school leaders and teachers, may benefit from the findings of the present study. Findings may also be valuable for those who would like to leverage student learning and achievement by supporting teachers' learning practices. Besides, findings concerning the mediating role of individual academic optimism between teacher self-efficacy and teacher professional learning include the potential to contribute well to the related literature. Finally, further studies related to teacher professional learning and designed in qualitative or mixed methods may depend on the findings of the current study to go further on the construct. Figure 1, then, illustrates the conceptual (hypothesis) model tested in the current study.

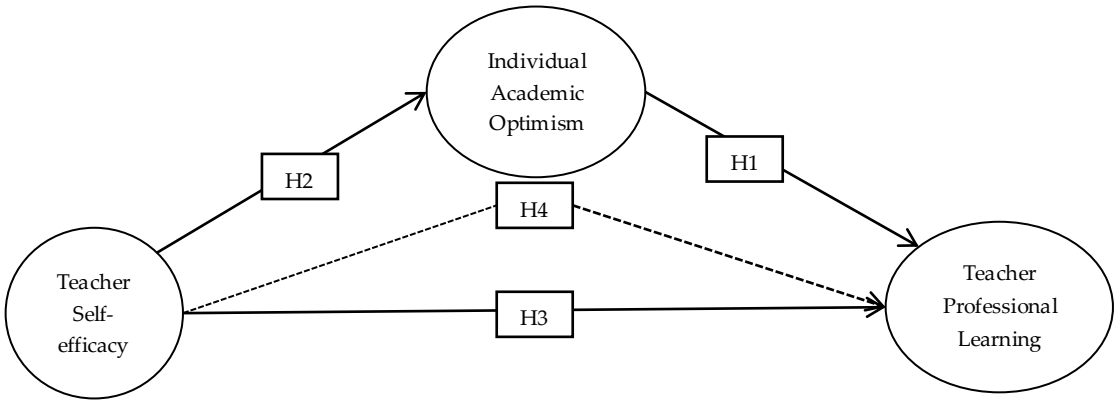

Figure 1. Conceptual (Hypothesis) Model

Method

Design

The research design was a correlational study identifying the direct predictive powers of independent variables (teacher self-efficacy and ındividual academic optimism) on the dependent variable (teacher professional learning). The Structural Equation Model (SEM) tests both the predictive relationships among endogenous and exogenous factors and latent factor structures of factor analysis (Çokluk, Şekercioğlu, & Büyüköztürk, 2016; Sümer, 2000). This study also investigated the indirect power of the independent variable (teacher self-efficacy) on teacher professional learning through ındividual academic optimism.

Participants

The research population was 300 teachers employed in primary and secondary schools in Karabuk province. We conducted a convenient sampling strategy and then contacted school principals with whom we are acquainted and asked them to invite the teachers working in their schools to participate in the study by filling out the online survey forms. We often distributed forms through emails and WhatsApp applications. The sampling was composed of 53.7% (n = 161) female and 46.3% (n = 139) male teachers. 19 teachers (6.3%) had an associate degree while 262 (87.3%) had bachelor and 19 (6.3%) had a postgraduate degree. Furthermore, participant teachers' years of experience varied from 1 to 41, while the mean for years of experience was 18.42 and the standard deviation was 8.92.

Instrumentation

Teacher Professional Learning Scale (TPL): This scale was developed by Liu et al. (2016) and adapted into Turkish by Gümüş, Apaydın, and Bellibaş (2018). The scale comprised a total of 27 items under four subscales entitled collaboration (C) (6 items), reflection (R) (10 items), experimentation (E) (5 items) and reaching out to the knowledge base (RKB) (6 items). The scale uses a five-point Likert-type scale (1 = totally disagree, 5 = totally agree) and some of the sample items are as follows: "I work with colleagues to plan educational activities", "I work together with colleagues to share teaching experiences." According to the Confirmatory Factor Analysis (CFA) performed by Gümüş and colleagues, the scale was confirmed in Turkish language and culture (RMSEA = .072; GFI = .85; AGFI = .81; NFI = .94; CFI = .96; SRMR = .40). Furthermore, the Cronbach's alpha coefficient was calculated .82

for collaboration, .83 for reflection, .85 for experimentation, .77 for reaching out to the knowledge base and .92 for the total scale. In this study, we performed CFA to examine the validity of the adapted scale and the finding from CFA verified the four-factor structure of the adapted version of the scale (RMSEA = .003; GFI = .98; AGFI = .93; NFI = .98; CFI = .99; SRMR = .008). We also calculated the Cronbach's Alpha coefficient, and it was found to be ranging from .55 to 68 for the subscales and .95 for the total scale.

Individual Academic Optimism Scale (IAO): This scale developed by Beard et al. (2009) and adapted into Turkish by Yıldız (2011) and using five-point Likert-type scale (1 = totally disagree, 5 = totally agree) was originally composed of 11 items under three subscales entitled teacher sense of self-efficacy, teacher trust in parents and students, and teacher academic emphasis. Some of the sample items from the scale are as follows: "I trust in my students" and "I press my students to achieve academically". A study conducted by Yıldız (2011) to test the factor structure of the scale yielded a three-factor structure and the factors explained 40% of the total variance. Furthermore, other studies reached different results for the factor structure of the scale. For instance, Yalçın (2012) revealed that the scale also yielded to a one-factor structure as two items were removed from the scale because of low factor loadings. In another study conducted by Özdemir and Kılınç (2014), the items of the scale were found to be grouped into a single factor including items with factor loadings ranging from .41 to 78, which explained 44.26% of the total variance. Considering that there are conflicting findings on the validity of the scale, we preferred to test the validity of the scale within the present study. Our findings revealed that the scale yielded a single-factor structure and this single-factor model had an acceptable level of goodness of fit index (RMSEA = .079; GFI = .93; AGFI = .87; NFI = .91; CFI = .93; SRMR = .061). Furthermore, we calculated Cronbach's Alpha .85 for the total of the scale and found the factor loadings ranging from .41 to .66.

Teacher Self-efficacy Scale (TSE): This scale was developed by Tschannen-Moran and Woolfolk Hoy (2001) and adapted into Turkish by Çapa, Çakıroğlu, and Sarıkaya (2005). The scale was clustered into three subscales entitled efficacy for student engagement (ESE) (8 items), efficacy for instructional strategies (EIS) (8 items), and efficacy for classroom management (ECM) (8 items). The items were questioned on a rating scale ranging from 1 (nothing) to 9 (a great deal). Several sample items from the scale are: "To what extent can you use a variety of assessment strategies?", and (2) "How well can you respond to difficult questions from your students?" The findings of Çapa et al. (2005) revealed that the Cronbach's Alpha for the subscales were .82 for efficacy for student engagement, .86 for efficacy for instructional strategies and .84 for efficacy for classroom management. When the relevant literature is reviewed, the scale was found to be used to examine self-efficacy level of teachers in a line of studies (Çalık, Sezgin, Kavgacı, & Kılınç, 2012; Sezgin & Erdoğan, 2015). For instance, Çalık et al. (2012) conducted CFA for the validity of the scale and concluded that the three-factor structure fitted data well. Furthermore, Sezgin and Erdoğan (2015) performed EFA to examine the factor structure of the scale and they decided to omit 10 items from scale and concluded that the remaining 14 items yielded a three-factor structure, as in line with the original scale form. In this study, the authors also performed CFA, and the findings showed that the three-factor structure of the scale was verified (RMSEA = .067; GFI = .86; AGFI = .83; NFI = .95; CFI = .97; SRMR = .031). The authors further calculated Cronbach's Alpha .88 for the total scale, and found that the factor loadings of the scale items changed from .45 to .67.

Data Analysis

This study performed SEM to test the relationship between variables and to examine the indirect predictive power of teacher self-efficacy on teacher professional learning through individual academic optimism. The data were analyzed through SPSS 25 and LISREL 8.80 programs. As the first step of the

data analysis, the authors analyzed the data set to find out whether the missing and outlier values existed and removed outliers. They conducted the expectation-maximization (EM) algorithm to randomly assign missing values. In order to perform SEM, some assumptions were tested before analysis. These were related to whether observable and latent variables yielded to a normal distribution, whether there was multicollinearity problem among variables and whether the outliers were removed from the dataset (Çokluk et al., 2016; Sümer, 2000; Şimşek, 2007). In this regard, the authors first performed the normality of the data through Kolmogorov-Smirnov (KS) analysis ($p > .05$), and consulted skewness and kurtosis (-1,+1) (Tabachnick & Fidell, 2007), (-2,+2) (George & Mallery, 2010) coefficients. Kolmogorov-Smirnov test scores revealed that test distribution showed non-normality ($p < .05$). Then, skewness and kurtosis analysis tested the normality and found that skewness and kurtosis scores ranged from .44 to -.14 for teacher professional learning, -.06 to - .31 for individual academic optimism and .29 to - .20 for teacher self-efficacy. The authors concluded that the data yielded a normal distribution. Furthermore, the Variance Inflation Factor (VIF), Condition Index (CI), and Tolerance Value (TV) were calculated to test the autocorrelation assumption. A VIF value smaller than 10 (VIF < 10), TV over .10 (TV > .10) and CI under 30 (CI < 30) denote that there was no multicollinearity problem among variables (Çokluk et al., 2016; Sümer, 2000). Results revealed that the correlations among study variables were not over .62 and that VIF, TV, and CI values were found to meet the assumptions required for conducting the SEM. The Pearson product-moment correlation coefficient was used to identify the relationships among variables and path analysis was performed to examine the direct and indirect predictive power of the independent variable on the dependent variable. Also applied were goodness-fit indices such as X^2/Sd, RMSEA, RMR, CFI, IFI, NFI, GFI, and AGFI to test the model fit.

In the last episode of the data analysis process, the authors used the PROCESS macro developed by Hayes (2009). It can be integrated into SPSS. The PROCESS macro allows researchers to perform mediation and moderation analysis using bootstrapping. Hayes and Roockwood (2020) suggest that researchers avoid the Sobel test to examine the mediations. The Sobel test is performed on the presumption that the data yields a normal distribution. Therefore, bootstrapping provides more sound results as it works in a 95% confidence interval.

Results

The relationships among teacher self-efficacy, individual academic optimism, and teacher professional learning are displayed in Table 1.

Table 1. The Relationships Among Study Variables in the Conceptual Model

Variables	$\bar{x}$	SD	ESE	EIS	ECM	TSE	C	R	E	RKB	TPL	IAO
ESE	4.09	.54	1	.70**	.54**	.87**	.39**	.46**	.45**	.47**	.52**	.55**
EIS	4.19	.41		1	.61**	.87**	.46**	.55**	.56**	.50**	.60**	.60**
ECM	4.21	.54			1	.85**	.37**	.38**	.41	.35**	.44**	.47**
TSE	3.13	.43				1	.47**	.53**	.54**	.51**	.59**	.62**
C	4.28	.58					1	.67**	.49**	.65**	.82**	.44**
R	4.16	.52						1	.69**	.77**	.90**	.53**
E	4.37	.55							1	.68**	.83**	.48**
RKB	4.06	.63								1	.91**	.49**
TPL	4.22	.49									1	.60**
IAO	4.19	.45										1

** Correlation is significant at the p<.01 level.

Table 1 illustrates that all variables are related in a positive and significant direction. Furthermore, the findings illustrated moderate positive and significant relationships between teacher self-efficacy and individual academic optimism (r = .61; p < .05), teacher self-efficacy and teacher professional learning (r =.59; p < .05) and individual academic optimism and teacher professional learning (r =.59; p < .05). After analyzing the correlations among study variables, a path analysis was performed to examine the predictive powers of teacher self-efficacy and academic optimism of individual teachers on teacher professional learning. The findings are presented in Figure 2.

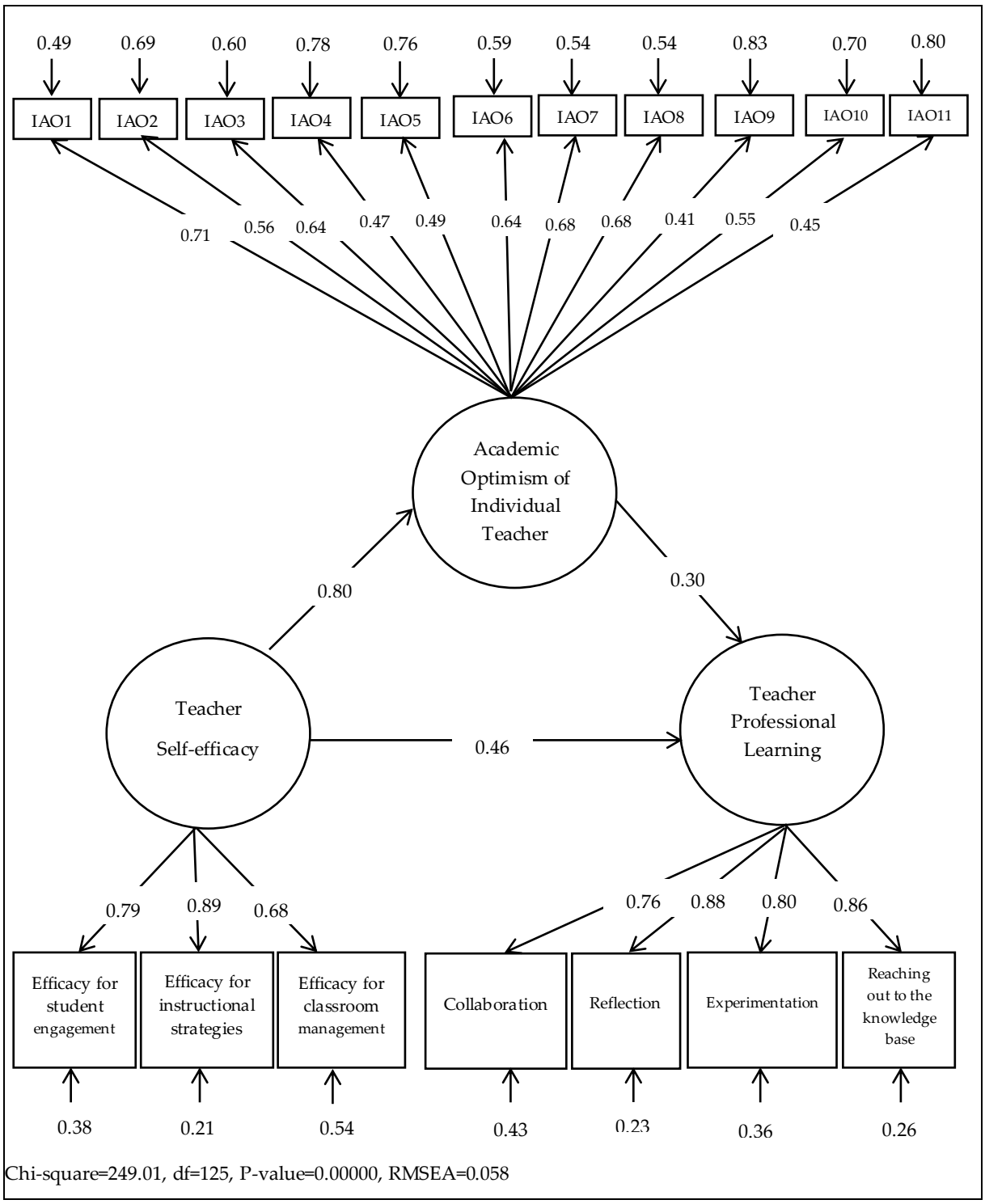

Figure 2. Path Analysis Diagram for the Prediction of Teacher Professional Learning

As can be seen from Figure 2, the model fitted well with the data concerning the standardized regression and t values. Findings revealed that teacher self-efficacy predicted individual academic optimism (.80; t = 11.00; p < .05) and teacher professional learning (.46; t = 4.22; p < .05) positively and significantly. This finding denotes that teacher self-efficacy was a stronger predictor of individual academic optimism than teacher professional learning. The independent and mediating variable of the model, individual academic optimism was a relatively weaker predictor of teacher professional learning than teacher self-efficacy (.30; t = 2.72; p < .05). Findings, therefore, validated H_1, H_2, and H_3. The level of goodness of fit index concerning the research model is shown in Table 2.

Table 2. Fit Indices Concerning the Model

Good Fit	Acceptable Fit	Fit Values	Fit
$\chi 2/sd < 2$	$3<\chi 2/sd<5$	1.992	Good
RMSEA <0.05	0.06<RMSEA<0.08	0.058	Acceptable
RMR<.050	.050< RMR <.080	0.021	Good
NFI > 0.95	0.90< NFI <0.94	0.96	Good
CFI > 0.95	0.90 <CFI <0.95	0.98	Good
IFI > 0.95	0.90< IFI <0.95	0.98	Good
GFI > 0.90	0.85< GFI <0.89	0.92	Good
AGFI> 0.90	0.85< AGFI <0.89	0.88	Acceptable

*Fit intervals for model fit indices were prepared based on the studies conducted by Meydan and Şeşen (2011) and Seçer (2013).

The model in Table 2 displayed an acceptable level according to the goodness-of-fit index. Upon examining the fit indices, it was found that some of the fit indices indicated a perfect fit (e.g. X^2/sd = 1.99, RMSEA = .05, RMR = .02, NFI=. 96, CFI = .98, IFI=.98) (Byrne Barbara, 2010; Kline, 2015; Schumacker & Lomax, 2004; Sümer, 2000; Tabachnick & Fidell, 2007) while others such as GFI (.92) (Hu & Bentler, 1995) and AGFI (.88) (Meydan & Şeşen, 2011; Seçer, 2013) indicated a good fit. This finding suggests that the conceptual model built in this study showed a good fit with the data. The mathematical model related to structural equations among variables is presented in Table 3.

Table 3. The Mathematical Model Related to Structural Equations Among Variables

Structural Equations	IAO = .86* TSE, Errorvar.= .41 , R^2 = .65
	TPL = .72* TSE, Errorvar.= .55, R^2 = .49
	TPL = .29* IAO + .48* TSE, Errorvar.= .52, R^2 = .52

As can be seen from equations in Table 3, the relationship between teacher self-efficacy and teacher professional learning was mediated partially by individual academic optimism. While teacher self-efficacy alone explained 49% of the total variance in teacher professional learning, it increased to 52% as individual academic optimism was integrated into the model. Thus, findings supported the notion that teacher self-efficacy in student engagement, instructional strategies, and classroom management predicted their optimist perspectives on teaching and students as well as their perceptions of professional learning related to knowledge sharing, collaboration among colleagues, and teaching processes. The authors also examined Bootstrapping samples to test the significance of the mediating role of individual academic optimism between teacher self-efficacy and teacher professional learning. Results for 5000 Bootstrapping are in Table 4.

Table 4. Findings on the Mediating Role of Individual Academic Optimism the Model

		Product of Coefficients		Bootstrapping %95 Confidence interval	
Prediction	**Estimates**	**SE**	**p**	**Lower**	**Upper**
Direct	.22	.04	.000	.1370	.3045
Indirect	.46	.07	.000	.3371	.5928
Total	.68	.05	.000	.5787	.7911

Findings in Table 4 revealed the partial mediating role of individual academic optimism between teacher self-efficacy and teacher professional learning to be statistically significant, validating H_4. In other words, the difference between the total and direct effects teacher self-efficacy on teacher professional learning was statistically significant [(Indirect effect = .22; p = 00), and there was a 95% Confidence Interval (.1370, .3045)].

Conclusion and Discussion

In this study, we developed a conceptual model to investigate the factors that predict teacher professional learning. Teacher self-efficacy was treated as an independent variable, teacher professional learning as a dependent, and individual academic optimism as both an independent and a mediating variable in the hypothesis model. The authors investigated teacher professional learning based on the conceptualization of Liu et al. (2016), which treated the construct as a four-factor structure entitled collaboration, reflection, experimentation, and reaching out to the knowledge base. Afterward, the conceptual model was tested via a path analysis with the observed variables. Results revealed that there are positive and significant relationships between teacher self-efficacy, teacher professional learning, and individual academic optimism and that teacher self-efficacy is an important variable that predicts individual academic optimism and teacher professional learning positively and significantly. Furthermore, results indicated that individual academic optimism predicted teacher professional learning positively and played a partial mediating role between teacher self-efficacy and teacher professional learning. As a whole, the results showed that the hypothesis model tested within this study fitted well with the research data and was verified. In this regard, findings produced from the current study were discussed in line with the relevant literature. The authors also argued the limitations of the study and presented implications based on the research findings here in this section.

There is a positive and statistically significant relationship between teacher self-efficacy and teacher professional learning. In other words, teachers who believe that they can reach difficult students, develop students' critical thinking skills, control negative student behavior, use effective teaching strategies that support student learning, manage their classroom effectively for the purposes of teaching, and enable their students to participate effectively in the learning process communicate well with students and parents, trust more in their students, and exert more efforts to improve themselves professionally. Extant literature also includes pieces indicating that teachers with high self-efficacy belief are more willing to implement new teaching methods and techniques (Guskey, 1988), tend to participate more in decision-making processes in school (Allinder, 1994), benefit from colleagues' experiences to sustain professional learning (Basom & Frase, 2004; Pan, 2014), and are more willing to produce effective teaching practices (Caprara et al., 2006; Lin et al., 2002). Findings from a study conducted by Kurt (2016) which illustrated that teacher self-efficacy was positively correlated with teacher professional development is also worth noting here in that it produced findings which have been in line with those of current study.

On the other hand, the emergence of positive relationships between teacher self-efficacy and individual academic optimism means that teachers who trust in their skills in respect to managing classroom, conducting effective instructional strategies and engaging students actively in the learning process focus more on student learning and develop effective instructional strategies to leverage student learning. Considering that teachers with a strong sense of academic optimism tend to flourish and

develop students' strengths (Woolfolk Hoy et al., 2008), communicate well with parents and students and trust in them (Ngidi, 2011) and collaborate with colleagues to improve instruction (McGuigan, 2005), it is possible to state that positive relationships evidenced between teacher self-efficacy and individual academic optimism is in accordance with the extant literature. Also the notion, as Beard et al. (2010) discussed, that academic optimism represents teacher beliefs in supporting student learning by contributing to the instruction conducted in the school made the emergence of positive relationships between teacher self-efficacy and individual academic optimism more understandable.

The results of the present study illustrate that teacher self-efficacy is an important variable explaining teacher professional learning. In other words, teachers' self-efficacy belief supports teacher professional learning. There are studies showing that teacher self-efficacy has a potential partial effect on teachers' professional learning (Hallinger, Hosseingholizadeh, Hashemi, & Koushari, 2018; Liu & Hallinger, 2018; McGuigan & Hoy, 2006). Unlike these studies, the results of the current research have proven the direct effect of teacher self-efficacy on teacher professional learning and the mediating role of academic optimism in this effect. Results regarding teachers with strong self-efficacy beliefs are more involved in professional learning activities support previous research results. For instance, relevant research revealed that teacher self-efficacy positively affects teacher professionalism (Koşar, 2015) and teachers' tendency to use different teaching practices to improve instruction (Wertheim & Leyser, 2002). Tschannen-Moran and Hoy (1998) argue that teachers who believe they can influence student learning on a large scale set higher targets for themselves and put more time and effort to arrive at them. Several scholars also linked professional learning with openness to new ideas and transforming them into practice (Timperley, 2011; Vescio et al., 2008). In this regard, it is possible to state that teachers who believe that they can manage the classroom effectively, make well use of instructional strategies to develop student learning and engage them in learning process show more enthusiasm to pursue professional learning. On the other hand, the results of the current study also showed that individual academic optimism predicted teacher professional learning positively and significantly. This finding implies that teachers with a strong sense of academic optimism are more likely to participate in professional learning practices. McGuigan and Hoy (2006) clarify that academic optimism is one of the factors that plays a crucial role in transforming a school into a professional learning community. Beard et al. (2010) also argue that several prominent factors that separate academically optimism teachers from others are their continuous efforts to increase student learning, and their efforts to develop original instructional activities and transform them into practice and to collaborate with colleagues to increase the quality of education in school. Therefore, teachers with a strong sense of academic optimism perceive professional learning as a prerequisite for contributing to student learning and assume that they can support students by developing themselves professionally.

Research results show that teachers' perception of individual academic optimism mediates the effect of teacher self-efficacy on teacher professional learning. This finding contributes to academic debates suggesting that teachers who have strong self-efficacy beliefs and positive tendencies to improve teaching play a pivotal role in supporting professional learning (De Neve et al., 2015; Kwakman, 2003; Liu et al., 2016; Thoonen et al., 2011). Relevant literature includes several studies proving that individual academic optimism has a direct impact on teacher professional learning. For instance, some research results reveal that academic optimism contributes to turning a school into a professional learning community (McGuigan & Hoy, 2006) and support teacher's constant efforts to increase student learning, develop new teaching practices and act in collaboration with colleagues (Beard et al., 2010). The current research evidenced that individual academic optimism plays a partial mediating role in the relationship between teacher self-efficacy and teacher professional learning. It is possible to find in the literature, articles which have discovered the empirical links between teacher professional learning and trust (Hallinger et al., 2017; Li, Hallinger, & Walker, 2016), communication (Qian, Walker, & Yang, 2016), and teacher agency (Hallinger et al., 2017). This shows that teacher development processes play an important role in teacher learning in effective schools. Apart from the empirical evidence, researchers state that self-efficacy beliefs can affect professional teacher learning theoretically (Tschannen-Moran & Woolfolk Hoy, 2001). It is therefore understood that teachers with

high levels of individual academic optimism regard professional learning as a prerequisite for contributing to student learning and that they think they can support student learning by developing themselves professionally.

Limitations and Implications

In terms of the limitations of the study, it must first be noted that the measures (Teacher Professional Learning Scale, Academic Optimism of Individual Teacher Scale and Teacher Self-Efficacy Scale) used in the current study were based on the self-assessment of participant teachers on their behavior and beliefs. This may result that participant teachers may not be objective enough to accurately reflect their thoughts and perceptions on the study constructs. This also involves the potential to undermine the objectivity of the data. The second limitation of the study may be that this study was conducted only on teachers employed in schools located in the city center of Karabuk province. The fact that the population was not nationally representative would make it difficult to generalize the research findings. In this regard, our findings need replication in different samples by researchers focusing on teacher professional learning in other parts of Turkey in order to make more sound conclusions. On the other hand, another point to be stressed in terms of limitations is that we do not know exactly the total number of schools in which participant teachers have been employed, which precludes performing multilevel analyses.

Putting aside the limitations, the findings of the current study include the potential to produce findings to contribute to the relevant literature. Results, therefore, revealed that teacher self-efficacy and individual academic optimism are important variables that predict teacher professional learning positively and significantly. This result becomes important especially for education systems such as Turkish national education system which often relies on top-down directives and tends to regard teachers as only practitioners in the instructional processes because the results verify that teachers need to have a strong sense of self-efficacy and academic optimism in order to participate in professional learning practices and thus to influence student learning and achievement positively. In this context, results suggest that the traditional frame of mind that treats teachers only as practitioners or technicians and teaching as only conducting instruction require deeper questioning. Furthermore, school-based practices that may positively influence teacher perceptions on their contributions to student learning, facilitate the emergence of healthy relationships among teachers, students, and parents, and support teacher crafts for student learning may accelerate teacher professional learning. Based on the results and limitations of the current study, it is possible to state that the literature begs for further research designed in qualitative and mixed methods in order to determine exactly how these relationships among variables evidenced within this study have taken place in real school settings. Finally, further scholarship may also focus on developing and testing conceptual models treating organizational behavior (e.g. trust, climate, culture), teacher personal characteristics (e.g. psychological hardiness, self-esteem) or principal leadership styles (e.g. instructional leadership, ethical leadership) as independent or mediating variables that may impact teacher professional learning.

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