



The relationship between teacher agency and teacher professional learning activities: the mediating role of teacher self-efficacy

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Abstract

Teacher professional learning activities have positive consequences for school outcomes. This study investigated the extent to which teacher agency is correlated with teacher professional learning activities using data from 582 teachers working in lower secondary schools in Ankara, Türkiye. Ankara, as the capital of Türkiye and a major educational hub, was chosen for its strong representational capacity. Using structural equation modeling (SEM), the relationship between teacher agency and teachers' professional learning activities, as well as the mediating role of teacher self-efficacy in this relationship, was tested. The results supported the mediation model, showing that teacher agency was related to teacher professional learning activities both directly and indirectly through teacher self-efficacy. These findings provide an in-depth understanding of how teacher agency is linked to teacher professional learning activities in the context of public schools in Ankara. We also offer practical recommendations for policymakers and school settings to promote teacher professional learning activities and enhance school outcomes.

Keywords

Teacher professional learning activities
Teacher agency
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Introduction

Teachers' participation in professional learning activities are critical for keeping their knowledge fresh and improving their teaching methods. Teacher education plays a critical role in pre-service as well as in-service education. The continuity of teacher training is important for the quality of education and this is a major concern not only in European countries but worldwide. Previous research points to the vital importance of teacher quality on educational outcomes (Helgevold, 2016; Pang, 2011). Research shows that effective teachers influence not only students' academic achievement but also their social lives (World Bank, 2022). Supporting students academically and socially and contributing to their overall development are the expectations educational stakeholders have from teachers. Meeting these expectations depend on teachers' qualifications and competencies (Lee & Lee, 2020). Therefore, the degree of importance that teachers attribute to their own professional development has implications not only for their personal growth but also for the academic and social development of their students. While existing literature has extensively explored the relationship between teachers' professional learning activities and educational outcomes (Akiba & Liang, 2016; Geleta & Raju, 2023; Rani et al., 2023), there

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remain significant gaps in understanding how such activities are shaped in real classroom settings—particularly in relation to teacher agency and self-efficacy. In addition, it has been determined that the quality of teachers has a significant impact on both student achievement and the effectiveness of education (Rockoff, 2004). Likewise, improved pedagogical practices and school-level progress have been positively correlated with teacher learning, defined as a continuous reflective and collaborative professional development process (Avalos, 2011). Initiatives aimed at teachers' professional development have also been crucial in promoting changes in education, increasing teachers' motivation, and ultimately improving student achievement (Desimone & Garet, 2015). Given that professional learning activities serve as a vital mechanism for improving instructional quality and the broader educational experience, it is imperative for future research to investigate the complex interplay among teacher learning, agency, and self-efficacy. To this end, scholarly attention should focus on identifying multilevel determinants—at the teacher, classroom, and school levels—that shape meaningful teacher engagement in professional learning.

A review of previous research on teacher professional learning activities reveals a focus on various aspects such as how teachers learn in schools (Meirink et al., 2009), processes contributing to teacher learning (Voogt et al., 2011), factors influencing teachers' participation in professional learning activities (Kwakman, 2003), current-century teacher education practices (Lieberman & Pointer Mace, 2010), relationships between teachers' professional learning activities and classroom culture (Supovitz & Turner, 2000), and the effects of organizational conditions and leadership practices on teachers' professional learning (Geijssels et al., 2009). These studies highlight an emphasis on examining factors influencing teacher professional learning activities and their relationship with other school factors. Despite most teachers striving to maintain high standards in educational activities, they often struggle to reflect this in their professional learning activities (Garet et al., 2001). One reason for teachers' difficulty in translating their support for high educational standards into professional learning activities are believed to be teacher agency. Literature on teacher agency has explored relationships between teacher identity (Choi, 2022), professional development (Lai et al., 2016), and school leadership and agency (Al-Mahdy et al., 2023; Al-Mahdy et al., 2024; Hilal et al., 2022; Polatcan, 2021). However, to the best of our knowledge, no empirical study to date has directly examined the relationship between teacher agency and teacher professional learning activities, nor has it explored the mediating role of teacher self-efficacy in this relationship. Although various studies have examined teacher professional learning in relation to either agency or self-efficacy independently, there is a notable lack of research integrating all three constructs within a single mediational framework.

Although the concepts of teacher agency and self-efficacy have been extensively discussed in previous research (e.g., Buxton et al., 2015; Eteläpelto et al., 2014; Imants & Van der Wal, 2020), empirical studies that integrate both constructs within a single mediational model to explain teachers' engagement in professional learning activities remain scarce. Most existing work has either examined these constructs separately or approached them from a conceptual or theoretical angle. To address this gap, our study empirically tests a model in which teacher agency influences professional learning through the mediating role of self-efficacy. This approach provides a more comprehensive understanding of how internal psychological mechanisms shape teacher learning, particularly within the centralized education system of Türkiye.

The relationship between teacher agency and teacher professional learning activities are likely to be shaped by several mediating variables rather than operating through a direct pathway. Indeed, prior studies have indicated that the influence of teacher agency on various teacher-related outcomes is often exerted through mediational mechanisms (Hilal et al., 2022; Mifsud & Vella, 2018), one of which is teacher self-efficacy (Polatcan et al., 2023). However, there remains a notable gap in the literature regarding how teacher self-efficacy functions within the relationship between teacher agency and teacher professional learning activities, specifically, whether it serves a mediating role. Existing research has examined teacher self-efficacy in relation to teacher enthusiasm (Burić & Moe, 2020; Michos et al.,

2022), classroom management (Chao et al., 2017; Hettinger et al., 2021), and instructional practices (Woodcock et al., 2022). In addition, its mediating role has been explored in the context of leadership and agency (Özdemir et al., 2023; Polatcan et al., 2023), student achievement (Kılınç et al., 2023a), teacher outcomes (Ahn & Bowers, 2024), school climate and teacher stress (Hu et al., 2019), and motivation and job satisfaction (Chang & Sung, 2024). However, there has been no study to examine whether teacher self-efficacy mediates the relationship between teacher agency and professional learning activities. It is particularly important to investigate these concepts in the K-12 context in Türkiye. Türkiye has undergone significant educational transformations in recent years, including curriculum restructuring, decentralization efforts, and reforms aimed at increasing teacher autonomy. Furthermore, Turkish teachers work within a unique sociocultural and policy framework that shapes their agency feelings and professional learning behaviors. Theoretical insights and practical implications for similar centralized education systems can be gained by understanding how these dynamics emerged in Türkiye. Despite these developments, empirical studies examining how teacher agency, self-efficacy, and professional learning interact in this context remain limited. In response to these gaps, the present study aims to explore the relationship between teacher agency and professional learning activities and to determine the mediating role of teacher self-efficacy within this relationship. The following research questions will be addressed:

1. To what extent is there a statistically significant relationship between teacher agency and professional learning activities?
2. To what extent does teacher self-efficacy mediate the relationship between teacher agency and professional learning activities?

By addressing this underexplored intersection of teacher agency, self-efficacy, and teacher professional learning activities, the present study offers several meaningful contributions to both theory and educational practice. First of all, it is assumed that it will positively affect the teacher's role and increase student achievement by contributing to teachers' classroom teaching activities. In a world where student achievement is so important, there is no study in the literature that examines the relationship between teacher professional learning activities and teacher agency, along with the mediating effect of teacher self-efficacy in this relationship. This study is expected to make multifaceted contributions to both the literature and practice. It will raise awareness among administrators, school principals, and teachers about the causes of teacher professional learning activities and will enable them to act more consciously during implementation. This study will fill a gap in the literature with its results. Additionally, the study is expected to contribute to policymakers by examining the factors affecting teachers' professional learning activities and aiding in the creation of educational policy on this issue. Furthermore, investigating these relationships in the Turkish K-12 context is especially relevant given ongoing curricular reforms, the growing emphasis on teacher autonomy, and shifts in national policy that position professional learning as central to educational quality. Despite these developments, empirical research examining how teacher agency, self-efficacy, and professional learning intersect within Türkiye's centralized education system remains scarce. Understanding these dynamics may yield valuable insights for policymakers and practitioners seeking to strengthen teacher development and improve student outcomes.

Conceptual Framework

This study, which investigated the mediating effect of teacher self-efficacy in the relationship between teacher agency and professional learning activities, is grounded in the theoretical framework of self-efficacy, a concept developed within Albert Bandura's (1977) Social Learning Theory, specifically the concept of self-efficacy. Self-efficacy is defined as "the belief in one's capabilities to organize and execute the courses of action required to manage prospective situations" (Bandura, 1995). Bandura (1997) argues that individual abilities vary, leading to the consideration of self-efficacy as a series of differentiated self-beliefs across various domains of functioning. There are four primary sources of self-

efficacy: physiological and emotional states, social persuasion, vicarious experiences, and mastery experiences (Marschall & Watson, 2022). Teacher self-efficacy in particular, is associated with the degree to which teachers feel competent to influence instructional processes and student outcomes (Henson, 2001). In this study, we propose that teacher self-efficacy influences teacher professional learning activities based on these relationships.

Bandura (1986) further emphasizes that human agency emerges from the interaction between individual capacities and environmental conditions. Within this framework, teacher agency refers to the capacity of teachers to act purposefully and autonomously in shaping their professional roles. Bandura's (2001) agentic perspective highlights a reciprocal relationship between self-efficacy and agency: individuals' efficacy beliefs enable agentic action, while agentic experiences in turn shape and reinforce efficacy beliefs. In this context, we posit that teacher agency plays a formative role in the development of self-efficacy, particularly in relation to professional growth and learning. While previous research has reported a directional path from teacher self-efficacy to teacher agency (Polatcan et al., 2023), our study proposes the reverse—namely, that teacher agency is correlated with teacher self-efficacy. This theoretical stance is consistent with Bandura's conceptualization, which underlines the active, intentional, and reflective dimensions of agency in shaping individuals' beliefs about their own effectiveness. Accordingly, this study conceptualizes the relationship between teacher agency and self-efficacy as dynamic and mutually reinforcing, while positioning agency as the antecedent variable that contributes to the development of efficacy beliefs within the scope of teachers' professional learning.

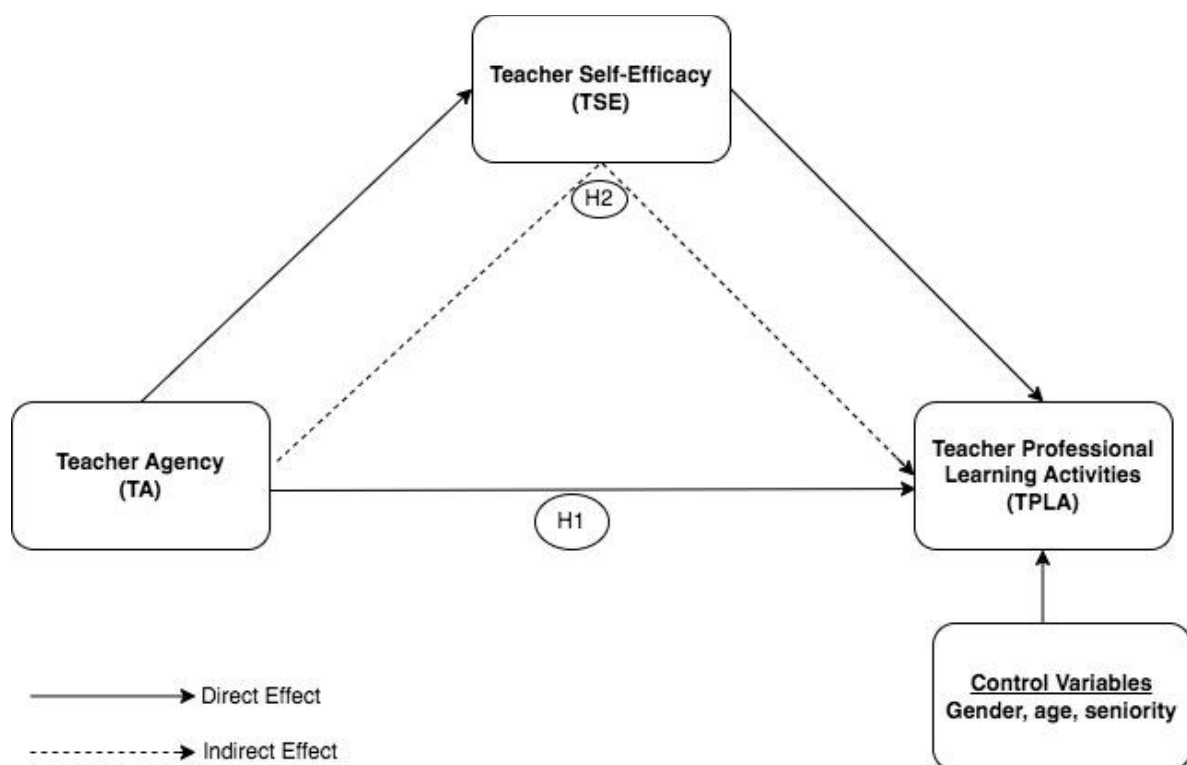


Figure 1. The proposed mediation model linking teacher agency and teacher professional learning activities

Teacher agency and teacher professional learning activities

Recent studies in the field of education have underscored the critical importance of teacher agency (Chung, 2023; Hendawy et al., 2024; Li & Ruppard, 2021). However, the lack of understanding and a clear definition of how agency manifests makes it challenging to differentiate between teachers who demonstrate agency and those who do not (Aspbury-Miyanishi, 2022). Agency can be defined as the capacity to control one's professional practices, work environments, and professional identity (Shavard, 2022). Teacher agency is defined as the ability of teachers to make choices inside and outside the classroom, to take informed action, and to show willingness in their professional development journey (Toom et al., 2015). Agency empowers teachers to initiate their professional activities by granting them the freedom to act (Molla & Nolan, 2020). Teaching activities conducted within a conventional framework are intertwined with various aspects of professional development, rendering teacher agency multidimensional (Tao & Gao, 2017).

Teacher agency refers to teachers' tendency to take initiative, use their internal motivation, and make deliberate and planned efforts to contribute to the school's progress (Liu et al., 2016). In our study, we use Liu, Hallinger, and Feng (2016) teacher agency model to investigate teacher agency. This perspective examines teacher agency in four dimensions: learning efficacy, teaching efficacy, optimism, and constructive engagement. Learning efficacy refers to teachers' ability to improve their learning activities in every situation, including perseverance, motivation, and abilities (Emirbayer & Mische, 1998). Teaching efficacy is described as teachers' willingness to participate in their students' learning process (Frost, 2006). Optimism is defined as positively evaluating the future and retaining positive beliefs about the causes of events (Seligman, 2018). Constructive engagement refers to teachers' level of participation in professional learning processes in a planned, active, and goal-oriented manner (Liu et al., 2016).

Previous studies have emphasized the significant effects of teacher agency. Teacher agency affects teachers' perceptions of the function of education and their approach to students (Biesta et al., 2015). The observations show that teachers who exhibit agency act autonomously in adhering to the curriculum (Aşçı & Yıldırım, 2020). Furthermore, it has been found that the level of teacher agency affects teachers' participation in professional learning activities (Liu et al., 2016). According to the results of literature studies, teacher agency is expected to be related to teachers' professional learning activities.

Teacher professional learning activities are a process that continues throughout their careers and progresses in parallel with their beliefs about learning (Meirink et al., 2010). This process should involve a transition to strategies that are more effective than traditional ones (Korthagen, 2017). Teachers' learning should not only involve the transfer of knowledge, but also the creation of appropriate learning environments for teachers, the ownership of learning outcomes, and the provision of support (Kwakman, 2003). The participation of teachers in professional learning activities are crucial for improving the quality of education, enhancing the teaching profession's quality, and addressing deficiencies in students' learning processes (Akiba, 2015).

Teacher professional learning activities refers to a process in which teachers acquire new knowledge, skills, and values to enhance their educational services (Geijsel et al., 2001). In our study, teacher professional learning activities are examined through the framework developed by Geijsel et al. (2009). Within this framework, professional learning activities are categorized into three dimensions: staying current, experience and reflection, and changing teaching practices. Staying current evaluates the extent to which teachers engage in various activities to develop themselves professionally, emphasizing the importance of staying informed about recent developments in the field. The dimension of experience and reflection encompasses items related to teachers taking action to impart knowledge to students and reflecting on their practices, ultimately resulting in higher quality teaching practices (Geijsel et al., 2001, 2009). The dimension of changing teaching practices focuses on whether and to what extent teachers adapt their teaching methods within a certain period to meet the diverse learning needs of students, including motivating students, diversifying teaching strategies used in the classroom, and considering students' cultural backgrounds and emotional states (Geijsel et al., 2009; Kwakman, 2003).

One significant reason for the relationship between teacher professional learning activities and teacher agency is teacher agency itself. It is expected that for a teacher to demonstrate agency, they should have engaged in personal development and supported their professional learning activities. For instance, a study by Brodie (2021) found that agency facilitates teachers' participation in professional learning communities. The positive impact of teacher agency on professional learning has also been clearly demonstrated (Polatcan, 2021; Wild et al., 2018). This association between teacher agency and teacher professional learning activities are expected to promote active participation in learning activities and foster a dynamic learning environment. Since Bandura (1995, 1997, 2001) defines individuals not merely as passive entities that react to environmental conditions, but as active agents capable of influencing their own behavior, environment, and living conditions. In our study, it is hypothesized that there is a relationship between teacher agency and teacher professional learning activities (H1).

Teacher Self-Efficacy as a Mediator

Individuals' beliefs in their own efficacy, which determine how they interpret situations and events, are the fundamental determinants of their behavior (Zee & Koomen, 2016). Individuals with high self-efficacy are those who take responsibility for their actions and can control them (Wang et al., 2015). Teachers' abilities and self-efficacy influence the structuring of the classroom environment and students' intellectual maturity (Bandura, 1997). Teacher self-efficacy is crucial because it affects students' motivation, persistence in new or challenging situations, and ability to achieve goals (Haworth et al., 2015). Teachers with self-efficacy express themselves freely and create an environment conducive to effective teaching by planning classroom activities (Huang et al., 2020).

The concept of teacher self-efficacy has been frequently studied in the Turkish context. These studies have explored variables such as teacher self-efficacy in relation to classroom management skills (Bayraktar & Çelik, 2021; Çelik, 2019; Demirtaş & Kahveci, 2010; Sak, 2015), leadership (Demir, 2018; Erdogan, 2023; Sağır & Tutkun, 2017), and teacher competencies and professional development (Bozğun & Can, 2021; Keskin & Aktay, 2021; Şeref & Çinpolat, 2021). Findings from these studies suggest that teacher self-efficacy is not merely an individual belief, but is also closely associated with the teaching process and professional attitudes.

Teacher self-efficacy refers to the belief in a teacher's ability to exhibit patience and success in any situation (Tschannen-Moran et al., 1998). In our study, teacher self-efficacy is approached from the perspective of Tschannen-Moran and Hoy (2001). In this perspective, teacher self-efficacy is examined across three dimensions: self-efficacy for student engagement, self-efficacy for using instructional strategies, and self-efficacy for classroom management. These dimensions reflect the richness of teachers' work lives and the requirements of good teaching (Tschannen-Moran & Hoy, 2001).

Although the concepts of teacher agency, self-efficacy, and professional learning activities have different theoretical foundations, some of their characteristics may appear to be interconnected or overlapping in practice. For instance, within the teacher agency framework, teaching activity reflects teachers' deliberate and proactive efforts to influence students' learning outcomes (Liu et al., 2016). However, self-efficacy in using teaching strategies refers to teachers' belief that they can effectively apply specific pedagogical techniques (Tschannen-Moran & Hoy, 2001). While both focus on instructional competence, the former emphasizes goal-oriented actions and conscious behaviors (Bandura, 2001). On the other hand, the latter is based on the self-perception of ability and control over teaching practices (Bandura, 1997). Likewise, the optimism dimension of the teacher agency relates to teachers' positive outlook and future expectations (Seligman, 2018). Since both encompass teachers' sustained motivation and forward-looking engagement, they may be conceptually compatible with the reflective practice component of professional learning activities (Geijssels et al., 2009).

Teacher self-efficacy belief is related to how competent and confident a teacher feels and a teacher with high self-efficacy beliefs believes that they can successfully fulfill their duties; this belief positively affects the teacher's performance (Lemon & Garvis, 2016). In this study, we focus on the mediating effect of teacher self-efficacy in the relationship between teacher agency and teacher professional learning activities. It is believed that if teachers exhibit agency, their self-efficacy beliefs will be affected, which in turn will impact teacher professional learning activities. Therefore, our study hypothesizes that teacher self-efficacy mediates the relationship between teacher agency and teacher professional learning activities (H2).

Method

Reserch Design

This study was designed using a survey research model. A survey model refers to research procedures conducted on an entire population or a sample selected from it, with the aim of reaching generalizable conclusions in a population composed of a large number of elements (Karasar, 2020). Among survey designs, model testing was adopted in this study to examine the hypothesized relationships between variables. In this study, structural equation modeling (SEM) was used to test the hypothesized relationships among teacher agency, teacher self-efficacy, and professional learning activities. SEM refers to a family of related statistical techniques used to examine complex relationships among observed and latent variables (Kline, 2023). This approach allows for the examination of both direct and indirect effects within a multivariate framework, enhancing the understanding of complex educational processes.

Procedure and participants

To ensure the ethical appropriateness of the study, an application was submitted to the Ethics Commission of the Senate of Hacettepe University. The Commission reviewed the study and granted ethical approval during its meeting held on March 6, 2023. Subsequently, official permission to conduct the research in public middle schools was obtained from the Ankara Provincial Directorate of National Education, which oversees the study's target population. Following the approval processes, the researchers visited the schools and provided participants with informed consent forms. Data were then collected face-to-face from those who voluntarily agreed to participate.

This study was situated within lower secondary schools, which constitute a critical stage of compulsory education characterized by structured curricular expectations and observable student academic performance. Moreover, teachers at this level often demonstrate an increased need for professional learning activities, making this context particularly suitable for exploring the variables under investigation. Data were collected from public lower secondary schools located in Ankara, the capital of Türkiye. Ankara was deliberately selected as the research site due to its central administrative role, demographic diversity, and strong representational capacity within the national education system. The choice of the lower secondary level and this specific location aligns with the study's goal of producing findings that are both contextually relevant and broadly applicable. Details regarding the population, sampling, and demographic characteristics of the participants are presented in Table 1.

Table 1. Population, Sampling and Participants (N=582)

District	Number of Schools	Number of Teachers	Percentage (%)	Sample Size	Participants Reached
Çankaya	67	2212	12.87	48	75
Altındağ	50	1661	9.66	37	55
Etimesgut	40	2033	11.83	45	62
Gölbaşı	25	514	2.99	11	35
Keçiören	69	3210	18.67	70	97
Mamak	68	2320	13.50	51	93
Pursaklar	18	745	4.33	16	29
Sincan	51	2213	12.87	48	62
Yenimahalle	57	2283	13.28	50	74
Total	445	17.191	100%	376	582

Table 1. Continued

	N	%
Gender		
Male	135	23.2
Female	447	76.8
Seniority (year)		
<=5	29	5
6-10	66	11.3
11-15	126	21.6
16-20	150	25.8
21=>	210	36.1
Age		
<=30	37	6.4
31-40	161	27.7
41-50	258	44.3
51=>	125	21.5
Education		
Bachelor's degree	479	82.3
Graduate	90	15.5

As shown in Table 1, the study population comprised 17,191 teachers working in 445 public lower secondary schools across nine central districts of Ankara during the 2023–2024 academic year. The sample was determined using a proportionate stratified sampling method, with the sample size from each district reflecting its relative share of the overall teacher population. This process resulted in a total sample size of 376 teachers. To ensure strong representativeness, districts with the largest teacher populations were prioritized. Accordingly, nine out of the ten districts with the highest number of teachers in Ankara were included in the sample. One district, Polatlı, was purposefully excluded despite its large teacher population due to its geographic remoteness, which posed substantial logistical challenges for in-person data collection. All other selected districts were located within or in close proximity to the urban center, thereby facilitating a more feasible and consistent data collection process. In total, data collection was carried out in 35 randomly selected public lower secondary schools across the sampled districts. In the implementation phase of the study, 600 data collection tools were randomly distributed to teachers in 35 schools. The data were collected by the researchers by visiting the schools, using face-to-face method and with the voluntary participation of the teachers. As a result, data were returned from 582 participants and data were obtained.

As shown in the table, 76.8% of the participants were female. This proportion is consistent with broader national and regional trends. According to national statistics for the 2023–2024 academic year, 58.29% of teachers working in public schools across Türkiye were female, while the proportion rose to 72.37% in Ankara (Ministry of National Education [MoNE], 2024). These figures suggest that the gender distribution in the sample aligns with the actual teacher population, particularly in metropolitan areas such as Ankara and Istanbul, where the teaching profession is predominantly occupied by women. In addition nearly half of the participants were in the middle age group. Considering their educational background, bachelor's degree constitutes a significant majority of the participants. Finally, the professional experience of the participants shows a balanced distribution

Measures

Teacher Agency: The Teacher Agency Scale (TAS), developed by Liu et al. (2016) and adapted to the Turkish culture by Bellibaş et al. (2019), is used to assess teacher agency. TAS is a four-dimensional scale consisting of 24 items. The dimensions of TAS are (a) learning efficacy, (b) teaching efficacy, (c) optimism, and (d) constructive participation. TAS is a 5-point Likert-type scale with scores varying between strongly *disagree* (1) to *strongly agree* (5). A sample item of the TAS is "Even when I feel bad, I can

actively participate in professional learning activities." CFA was conducted to test the structural validity of TAS. The results indicated a good fit for the four-factor structure (RMSEA=0.05, CFI=0.91, TLI=0.90, SRMR=.07, $\chi^2/sd = 2,38$). According to Hu and Bentler (1999), these fit indices fall within the acceptable thresholds (CFI and TLI ≥ 0.90 , RMSEA ≤ 0.08 , SRMR ≤ 0.08), suggesting a satisfactory model fit. The alpha coefficient for this scale is 0.90. Given that the TAS comprises four distinct dimensions, composite reliability was calculated, yielding a coefficient of 0.933.

Teacher Self-Efficacy: The Teacher Self-Efficacy Scale (TSES), developed by Tschannen-Moran and Hoy (2001) and adapted to the Turkish culture by Karaoğlu (2019), is used to assess teacher self-efficacy. TSES is a three-dimensional scale consisting of 12 items. The dimensions of TSES are (a) self-efficacy for student engagement, (b) self-efficacy for using instructional strategies, and (c) self-efficacy for classroom management. TSES is a 9-point Likert-type scale with scores varying *between nothing* (1) and *a great deal* (9). A sample item of the TSES is "How much effort can you put into convincing your students to succeed in school?" CFA was conducted to test the structural validity of TSES. The results indicated a good fit for the four-factor structure (RMSEA=0.078, CFI=0.92, TLI=0.90, SRMR=.05, $\chi^2/sd = 4,46$). According to Hu and Bentler (1999), these fit indices fall within the acceptable thresholds (CFI and TLI ≥ 0.90 , RMSEA ≤ 0.08 , SRMR ≤ 0.08), suggesting a satisfactory model fit. The alpha coefficient for this scale is 0.88. Given that the TSES comprises three distinct dimensions, composite reliability was calculated, yielding a coefficient of 0.909.

Teacher professional learning activities: The Teacher Professional Learning Activities Scale (TPLAS), developed by Geijsel et al. (2009) and adapted to the Turkish culture by Polatcan (2020), is used to measure teachers' professional learning activities. TPLAS is a three-dimensional scale consisting of 17 items. The dimensions of TPLAS are (a) staying current, (b) experience and reflection, and (c) changing instruction. TPLAS is a 4-point Likert-type scale with scores varying between *never* (1) and *always* (4). A sample item of the TPLAS is "I participate in in-service training activities even if they are not mandatory" CFA was conducted to test the structural validity of TPLAS. The results indicated a good fit for the four-factor structure (RMSEA=0.054, CFI=0.91, TLI=0.90, SRMR=.04, $\chi^2/sd = 2,66$). According to Hu and Bentler (1999), these fit indices fall within the acceptable thresholds (CFI and TLI ≥ 0.90 , RMSEA ≤ 0.08 , SRMR ≤ 0.08), suggesting a satisfactory model fit. The alpha coefficient for this scale is 0.86. Given that the TPLAS comprises three distinct dimensions, composite reliability was calculated, yielding a coefficient of 0.898.

Control Variables: Previous literature suggests a connection between teachers' gender, seniority, and their professional practices (Kılınç et al., 2023b). In our study, we have chosen to include gender, seniority, and age as control variables.

Analytic strategies

The 600 data collection tools gathered were transferred to the SPSS 26 program. Out of the 600 tools, missing and outliers were identified, leading to the elimination of 18 data collection tools. Consequently, analyses were continued on the remaining 582 data. Although the scales employed in this study were originally developed as multidimensional, composite scores were used in the analyses. This decision was theoretically grounded in Bandura's (1977) Social Learning Theory, which conceptualizes constructs such as teacher agency and self-efficacy as overarching latent traits influencing multiple related behaviors. Consistent with the guidelines provided by Bagozzi and Edwards (1998), the use of composite scores is appropriate when the subdimensions demonstrate conceptual unity and empirical consistency. In this study, the subdimensions within each scale exhibited high internal consistency, with Composite Reliability (CR) and Cronbach's alpha (α) values exceeding recommended thresholds. These results, along with the theoretical focus on the overall constructs rather than their specific dimensions, justify the use of composite scores for subsequent analyses. The data analysis process began with the analysis of descriptive statistics. Following this, Confirmatory Factor Analysis (CFA) was applied to the proposed model using Mplus 8.3 (Muthén &

Muthén, 2017) to provide structural discrimination between variables. Maximum likelihood (MLR) was used as the estimator in all analyses. The fit values of the research were examined. Since the research data were obtained from a single source—teachers—certain measures were taken to reduce common method bias (CMB). To manage CMB, we controlled for the effects of a single unmeasured latent method factor, as suggested by Lindell and Whitney (2001) and Podsakoff et al. (2012). This approach involved performing the common-method bias test by controlling for the effects of a single unmeasured latent method factor.

Next, we used structural equation modeling (SEM) to test the mediation model for the effects of teacher agency on teacher professional learning activities through teacher self-efficacy. At this stage, model fit was examined using CFI, TLI, and RMSEA, in line with the recommendations of Hu and Bentler (1999). Unidimensional variables were utilized when entering variables into SEM. To assess the linearity assumption, we created scatter plots of the dependent variable against each of the independent variables. We observed that there were no discernible curves or clusters of data points, confirming linearity. To address homoskedasticity, we plotted the residuals against the fitted values. The residuals were evenly distributed around zero without forming a distinct funnel shape, indicating homoskedasticity. Regarding the multicollinearity assumption, we calculated the variance inflation factor (VIF). The VIF values were all below 10, indicating that there was no multicollinearity between the independent variables. Finally, we assessed mediation indices and conditional indirect effects using bootstrap confidence intervals (CIs) based on 5000 bootstrapped samples (Hayes, 2022). Bootstrapping procedures were employed to test the significance of indirect effects, as the distribution of indirect effects is often non-normal (Preacher & Hayes, 2008). Bootstrapping provides a robust, non-parametric method for estimating confidence intervals without relying on the assumption of normality, making it particularly appropriate for mediation analysis in the context of this study.

Results

Descriptive statistics and correlations

Table 2 presents the means, standard deviations and Pearson correlations for the variables of this study. As shown in Table 2, teachers' perceptions of teacher agency ($M = 4.02$, $SD = .42$), teacher self-efficacy ($M = 7.37$, $SD = .82$), and teacher professional learning activities ($M = 3.11$, $SD = .37$) are generally high. These findings suggest that teachers exhibit a common pattern in their levels of agency and engagement in professional learning activities, whereas their perceptions of self-efficacy display relatively greater individual variation. Moreover, there are significant and positive correlations between teacher agency and teacher self-efficacy ($r = .45$, $p < .05$), teacher professional learning activities ($r = .59$, $p < .05$). Finally, there is a significant and positive correlation between teacher professional learning activities and teacher self-efficacy ($r = .48$, $p < .05$). These results show preliminary support for the hypothesis of the study.

Table 2. Descriptive statistics ($N=582$)

	M	SD	TA	TSE	TPLA
TA	4.02	.42	--		
TSE	7.37	.82	0.56*	--	
TPLA	3.11	.37	0.67*	0.57*	

Abbreviations: M, mean; SD, standard deviation; TA, teacher agency; TSE, teacher self-efficacy; TPLA, teacher professional learning activities; * $p < .05$.

Result of measurement model and common method bias

The results of the measurement model are presented in Table 3. The three-factor model (TA, TPLA, TSE) demonstrated a superior fit to the data compared to the alternative models ($\chi^2 = 2624.908$, $df = 1279$, $\chi^2/df = 2.05$, CFI = 0.85, TLI = 0.84, RMSEA = 0.04 and SRMR = 0.06). To assess potential common

method bias (CMB), we used the technique of controlling for the effect of a single unmeasured latent method factor (Podsakoff et al., 2012). After controlling for the common latent factor (CLF), there was no substantial improvement in model fit indices ($\chi^2 = 3722.798$, $df=1446$, $\chi^2/df=2.57$, CFI=0.81, TLI=0.79, RMSEA=0.05). Additionally, a chi-square difference test comparing the original measurement model with the CLF-adjusted model revealed a statistically significant difference ($\Delta\chi^2[167] = 1097.89$, $p < .001$). However, given that the inclusion of the CLF did not meaningfully enhance model fit, it can be concluded that common method bias is unlikely to pose a significant threat to the validity of the findings. Furthermore, the empirical distinction among the three constructs was confirmed, supporting their validity as separate latent variables. Furthermore, the comparative analysis of alternative models reinforces the discriminant validity of the three-factor structure. Model 1, which posits a unidimensional construct by merging TA, TSE, and TPLA, demonstrated the poorest model fit ($\chi^2/df = 3.81$, CFI = 0.59, TLI = 0.57, RMSEA = 0.07, SRMR = 0.07), indicating substantial misfit. Model 2, which combines TA and TSE into a single factor while treating TPLA as distinct, yielded slightly improved yet still unsatisfactory fit indices ($\chi^2/df = 3.30$, CFI = 0.66, TLI = 0.65, RMSEA = 0.06, SRMR = 0.06). In contrast, Model 3, representing TA, TSE, and TPLA as three separate latent constructs, exhibited notably superior fit statistics. These results provide robust empirical support for the conceptual distinction among the constructs, affirming their multidimensional nature within the proposed theoretical framework.

Table 3. Model fit results from confirmatory factor analysis.

Variable	χ^2	df	χ^2/df	CFI	TLI	RMSEA	SRMR
Model 3: TA;TSE;TPLA	2624.908	1279	2.05	0.85	0.84	0.04	0.06
Model 2: TA+TSE;TPLA	4380.093	1324	3.30	0.66	0.65	0.06	0.06
Model 1: TA+TSE+TPLA	5048.656	1325	3.81	0.59	0.57	0.07	0.07

Abbreviations: TA = teacher agency; TPLA= teacher professional learning activities; TSE= teacher self-efficacy

Hypotheses testing

First, we tested whether teacher agency had a directly correlated with teacher professional learning activities. The results showed that teacher agency had a significant correlated with effect on teacher professional learning activities ($\beta = .41$, $SE = .08$, 95% CI [.24, .57], $p < .001$). In addition, teacher self-efficacy was significantly correlated with teacher professional learning activities ($\beta = .26$, $SE = .05$, 95% CI [.16, .35], $p < .001$), while teacher agency also had a significant direct correlated with on teacher self-efficacy ($\beta = .60$, $SE = .06$, 95% CI [.50, .71], $p < .001$), explaining 36.5% of its variance ($R^2 = .365$). According to Gignac and Szodorai's (2016) guidelines, this indicates a relatively large effect size. The results confirm Hypothesis 1, indicating a significant relationship between teacher agency and teacher professional learning activities.

To test the mediating role of teacher self-efficacy (Hypothesis 2), we employed a bootstrapping approach with 5000 resamples (Preacher & Hayes, 2008). The analysis revealed that the indirect correlated between teacher agency and teacher professional learning activities through teacher self-efficacy was statistically significant ($\beta = .15$, $SE = .02$, 95% CI [.10, .20], $p < .001$), supporting Hypothesis 2. Approximately 27.6% of the overall relationship was explained by this mediating path, suggesting a medium-sized mediation. Finally, the total standardized relationship between teacher agency on teacher professional learning activities was strong ($\beta = .56$, $SE = .08$, 95% CI [.40, .73], $p < .001$), indicating that teacher agency is linked to professional learning both directly and indirectly. The model explained 37.9% of the variance in teacher professional learning activities ($R^2 = .379$), which also represents a relatively large effect size (Gignac & Szodorai, 2016). The model demonstrated a good fit to the data (CFI = .99, TLI = .98, RMSEA = .04). The model results are presented in Table 4 and illustrated in Figure 2.

Table 4. Standardised coefficients for testing the direct, mediating effects ($N = 582$)

	Coefficient		95% confidence interval		<i>p</i>
	Estimate	SE	Lower bound	Upper bound	
Direct effects					
TA -- TSE	.60	.06	.50	.71	*
TSE -- TPLA	.26	.05	.16	.35	*
TA -- TPLA	.41	.08	.24	.57	*
Indirect effects					
TA -- TPLA	.15	.02	.10	.20	*
Total effects					
TA -- TPLA	.56	.08	.40	.73	*

TA = teacher agency; TSE= teacher self-efficacy; TPLA= teacher professional learning activities; * $p < .05$.

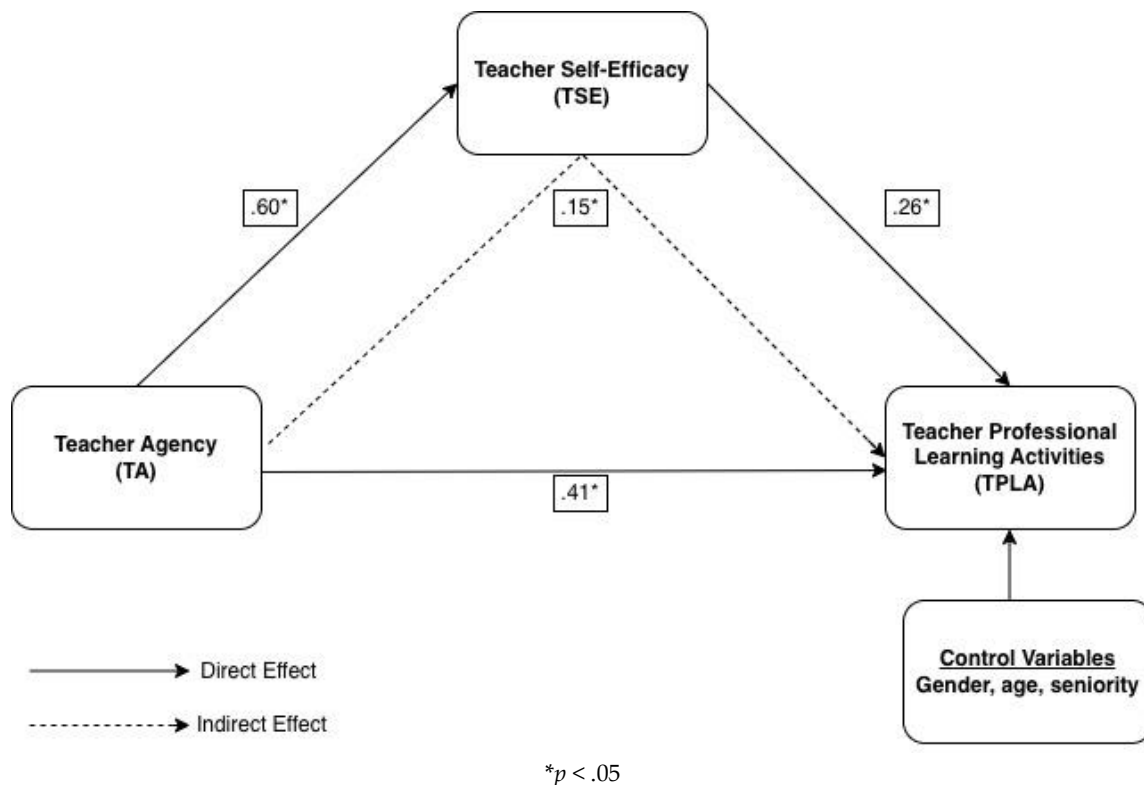


Figure 2. Structural model results illustrating the mediating role of teacher self-efficacy in the relationship between teacher agency and teacher professional learning activities.

As illustrated in Figure 2, the structural model visually represents the hypothesized relationships and standardized coefficients, emphasizing the mediating role of teacher self-efficacy in the pathway from teacher agency to professional learning activities. This visual layout complements the statistical results presented in the previous section.

Discussion

This study investigated the mediating role of teacher self-efficacy in the relationship between teacher agency and teacher professional learning activities. Age, gender, and seniority were included as control variables. As expected, there is a significant relationship between teacher agency and teacher professional learning activities. The results also show that teacher self-efficacy mediates the relationship between teacher agency and teacher professional learning activities. Additionally, the findings showed that teacher agency had an indirect correlation with teacher professional learning activities through teacher self-efficacy.

The interconnected roles of teacher agency and teacher self-efficacy in influencing teacher professional learning activities are highlighted in our study, which adds to the existing corpus of literature. The results show that self-efficacy mediates the relationship between professional learning and teacher agency, which is a significant antecedent of professional learning. All of these findings highlight the psychological processes that shape teachers' engagement in learning, particularly within the Turkish educational system where teacher development is a key priority. Teachers with greater agency also exhibit higher levels of self-efficacy, consistent with previous studies (Kim et al., 2018; Min, 2023). This supports the notion that teachers who perceive themselves as capable of initiating change and acting proactively possess greater confidence in their professional abilities. Prior research further indicates that teachers' willingness to participate in professional development is strongly influenced by their self-efficacy (Bray-Clark & Bates, 2003; Geijssel et al., 2009; Huang et al., 2020; Tschannen-Moran & McMaster, 2009), reinforcing the idea that self-efficacy fosters engagement in reflective and innovative learning activities. Additionally, studies have shown that teacher agency directly impacts professional learning (Brodie, 2021; Liu et al., 2016), with teachers who demonstrate higher agency being more likely to pursue opportunities for ongoing learning and growth (Liu et al., 2016).

Our findings further highlight the dynamic interplay between these constructs by demonstrating that teacher self-efficacy mediates the relationship between agency and professional learning activities. This result extends the limited body of research that integrates these three variables into a single mediational framework (Hilal et al., 2022; Mifsud & Vella, 2018) and provides empirical support for Bandura's (2001) Social Cognitive Theory, which posits that human behavior arises from the interaction of behavioral, environmental, and personal factors. A substantial body of research conducted in the Turkish context reinforces these findings, linking teacher self-efficacy to professional competencies (Bozgün & Can, 2021; Keskin & Aktay, 2021; Şeref & Çinpolat, 2021), leadership (Demir, 2018; Erdogan, 2023; Sağır & Tutkun, 2017), and classroom management (Bayraktar & Çelik, 2021; Çelik, 2019; Demirtaş & Kahveci, 2010; Sak, 2015). These studies collectively show that teacher self-efficacy is not merely an individual psychological attribute but is closely tied to teachers' professional behaviors and motivation to engage in development activities. By illustrating that self-efficacy not only influences professional learning but also serves as a psychological mechanism through which teacher agency translates into sustained professional growth, this study underscores its integrative role in promoting active teacher engagement—especially in centralized educational systems like Türkiye's, where opportunities for individual initiative may be constrained.

We theoretically and empirically confirmed the main hypothesis of our study, that teacher agency promotes teacher professional learning through teacher self-efficacy. In Türkiye, teachers often face challenges in taking initiative and exercising agency due to the highly centralized nature of the education system (Özdemir et al., 2023). Teachers with high self-efficacy can take initiative and assert their presence in the classroom. Teachers who lack self-efficacy do not consider the classroom atmosphere and apply the rules from the central system rigidly (Aydın, 2016). Teacher agency is important for the development of teacher professional learning activities. In a centralized country like Türkiye, teachers can only become agents through their own self-efficacy. Therefore, it is important to develop teachers' self-efficacy for teacher professional learning activities. Our study concluded that teacher agency affects teachers' self-efficacy beliefs and, thus, teacher professional learning activities. Therefore, it is essential to foster teachers' self-efficacy in order to support their engagement in professional learning activities. Our findings indicate that teacher agency significantly influences self-efficacy beliefs, which in turn affect participation in teacher professional learning activities.

For teacher professional learning to develop, teachers should be individuals who take initiative and have high self-efficacy beliefs. To achieve teacher professional learning activities, we suggest that teachers should be capable of taking initiative and becoming proactive subjects. From this perspective, teachers' self-efficacy beliefs will begin to increase, allowing them to assert their presence within the school organization. We have also demonstrated the importance of teacher self-efficacy for teacher professional learning activities, emphasizing that teachers should undergo in-service training to nurture their self-efficacy beliefs before they take office. In this way, they will actively participate in teacher professional learning activities as individuals with high self-efficacy once they begin their roles. Finally, to move away from the perception of teachers as passive implementers of centrally mandated decisions—common in Türkiye's centralized education system—teachers should be given greater autonomy to make pedagogical decisions at the local level. Policymakers should support this by empowering teachers with the authority to act independently. Ultimately, such measures have the potential to improve both teacher development and student learning outcomes. This aligns with previous recommendations that empowering teachers locally leads to more sustainable and impactful professional development (Avalos, 2011; Desimone & Garet, 2015).

Educational research is often oriented towards improving student performance. In our study, we focused on the teacher and investigated the direct effects of teacher agency and the indirect effects of teacher self-efficacy on teacher professional learning activities. As a result, our study offers a unique and original contribution to future teacher-related research in the field of education. By grounding our work in Bandura's Social Cognitive Theory and extending it through a mediational model, we offer new insights into the internal mechanisms that foster teacher learning and professional growth. We aimed for our study to set an example for researchers by building on the theoretical foundations of self-efficacy theory.

Limitations

This study has some limitations that may shed light for future researchers. First, in this study, direct and indirect relationships were investigated using a cross-sectional design. Therefore, a cause-and-effect relationship could not be established between the research variables. In the future, researchers could examine the changes in the relationships between variables over time by using a longitudinal research design. Second, the data were collected from only one source, namely teachers. In future research, consulting the views of other members of the school can make an important contribution. Third, only the mediating effect of teacher self-efficacy was investigated. Thus, we suggest future researchers to examine variables such as autonomy, trust, motivation, which may have a moderate impact on this model. Finally, qualitative research designs can be utilized to provide more detailed findings on the nature of the relationship between teacher efficacy and teacher professional learning activities. Fifth, the sample was limited to teachers working in public middle schools in Ankara, Türkiye. Therefore, the generalizability of the findings may be restricted to this specific population. Future research could include participants from different school levels, regions, or school types such as private institutions. Sixth, all data were collected through self-report questionnaires, which may be prone to social desirability bias or common method variance. Using multiple data sources or methods (e.g., interviews, observations) may strengthen the validity of future findings. Finally, although structural equation modeling (SEM) was used, the analysis was limited to linear relationships. Future studies could explore potential non-linear associations or test alternative models to uncover deeper patterns.

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