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The effect of school leadership on vocational learning with the mediating role of teachers' collective efficacy and the moderating role of uncertainty avoidance

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Abstract

The purpose of this research was to determine the effect of school leadership on professional learning with the mediating role of collective efficiency and the moderating role of uncertainty avoidance among elementary school teachers in the 2nd district of Urmia city. This research, in terms of its practical purpose, in terms of the descriptive-correlational research method, is of the structural equation modeling type and falls within the scope of causal modeling research. The statistical population of the current research was all primary school teachers of district 2 of Urmia city, numbering 1285. The statistical sample size was 296 using Cochran's formula. The sampling method in this research is the cluster method and the data collection tool is the questionnaire. In this research, the data analysis was done in two parts, descriptive and inferential. The results of the research hypotheses test showed that school leadership on professional learning, school leadership on collective efficiency, collective efficiency on The professional learning of school leadership has a positive and significant effect on the professional learning of teachers through the mediation of collective efficiency. Finally, the moderating role of uncertainty avoidance in the relationship between school leadership and collective efficacy of teachers was confirmed.

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Introduction

Education, as a part of the social system of society, has a key role in reforming and rebuilding the society from one generation to another (Ghasemzadeh et al., 2023). Undoubtedly, teachers are among the most important elements of educational environments and the most important factors for creating a favorable situation in the identification of educational goals (Rifai et al., 2019). In diverse communities, teachers are willing to learn from their colleagues through systematic collaboration and to continuously renew their professional knowledge and skills throughout their careers (Vanblaere & Devos, 2018). Professional learning is defined as the need of professionals to learn more while working and progressing in their profession (Saberi, 2021). As a collective capacity, it is based on cognitive and experimental processes and includes acquiring, sharing, and optimizing knowledge (Gilbert et al., 2010). Professional learning is a two-way, interactive, and collaborative process in which there is no constraint, and this learning is due to a profession that is directly related to the classroom and the teacher's profession and emanates from it (Rahmani, 2021). In fact, a dynamic, continuous, interactive, and developmental process provides opportunities for teachers to learn through activities and engage with new knowledge (Liu, Hollinger, & Fan, 2016). A set of experimental data suggests that professional learning activities contribute significantly to teachers' efficacy (Sulla & Rollo, 2023). Teacher professional learning is often characterized as the ongoing process of teachers' learning and growth, encompassing both formal professional learning activities (such as teacher research groups and mentoring relationships) and the informal learning that occurs within the context of their job. This dual approach, as highlighted by Hallinger and Kulophas (2020), underscores the significance of continuous learning for teachers. Acknowledging its pivotal role, teacher professional learning becomes a cornerstone in fostering student learning, as the effectiveness of teachers significantly influences students' learning outcomes (Chen, 2022). However, in establishing professional learning opportunities for teachers, the ability to lead through companionship, participation, and development of appropriate strategies plays a constructive role in the commitment, creativity, and professionalization of teachers (Thien & Liu, 2024; Tulowitzki, Pietsch, & Spillane, 2021).

Rooted in the school effectiveness movement, school leadership has developed worldwide thanks to its specific emphasis on teaching and learning, as well as the positive effects of instructional leadership on student learning and teacher performance, such as proven reliability, efficiency, and commitment (Liu et al., 2016). The functions of school leadership can play a significant role in improving the quality of education, maintaining efficient teachers, and achieving the goals of the school (Ahmad, Thomas, & Hamid, 2020). Critical to the success of school improvement efforts are the indirect effects of leadership on teaching and learning (Hallinger et al., 2020). principals' influence on school effectiveness operates indirectly through mediating variables—via teachers' attitudes and behaviors to create conditions that shape effective teaching and learning processes in the school; these processes, in turn, have positive implications for school effectiveness outcomes (Nadav, Benoliel & Schechter, 2025; Benoliel, 2021; Liu

& Hallinger, 2018; Tan, 2018). Among other factors that can contribute to the effectiveness of the school and the success of students is the collective efficiency of teachers; it offers significant potential for school administrators to exert influence over teaching and learning (Karacabey et al., 2022). Teacher leadership practices positively influence collective efficacy. This suggests that fostering teacher leadership can be a strategic approach to improving overall school effectiveness (Goddard et al., 2021; Hammad et al., 2024).

Collective efficacy is a pre-descriptive and dynamic construct that allows educators and designers to examine their strategies for community formation in the process and measure the effectiveness of their approach (Valizadeh, 2021). Collective teacher efficacy refers to the belief among school staff that we can make a positive difference in student learning, overcome classroom challenges, and adapt to changing circumstances (Hendawy Al-Mahdy, Emam, &Hallinger, 2018). Indeed, the literature suggests that teachers' collective efficacy may be a useful intermediate goal for school principals to enhance the impact of their leadership practices on professional learning and ultimately lead to improved student learning outcomes (Özdemir et al., 2023). On the other hand, new researchers believe that some cultural factors may affect the nature, extent, and impact of school leadership on efficiency and professional learning, and uncertainty avoidance is one of these issues, and to the extent that "a culture programs its members in such a way that they feel uncomfortable or comfortable in unstructured situations" (Hofstede, 2011).

In this framework, in active societies (those with relatively low levels of uncertainty avoidance), employees tend to use their voices more freely to change the way things are performed. When this concept is translated to schools, it suggests that teachers' attitudes toward uncertainty avoidance become a critical condition that may shape the effectiveness of school leadership on teachers' beliefs and behaviors (Hallinger & Kantamara, 2001). Uncertainty avoidance can have a significant impact on decision-making practices in organizations. Individuals and groups that avoid uncertainty may be more inclined to make decisions based on detailed analysis and control approaches. This approach can lead to slowness in the decision-making process and reluctance to take risks (Brewster et al., 2016). Employees with high uncertainty avoidance often require significant psychological support to manage change and confront new challenges (Bao, 2024). Tensions between leaders' beliefs and the organizational context, such as fear of colleagues' resistance, appeared to influence their choice to act or not concerning specific aspects of the professional learning (van den Boom-Muilenburg et al., 2024). leadership can mitigate employee resistance to change by reducing perceived uncertainty, particularly in high uncertainty avoidance contexts (Zhu et al., 2023).

Finally, it can be mentioned that education at the school level is the foundation of the entire pyramid of education and the most important sub-section of the foundation of educational organizations of any country in the world. However, in most developing or less developed countries, primary school management practices and school leadership experience inefficiency, which is ultimately the main cause of ineffective

teaching by teachers and poor student outcomes in these schools. Therefore, the present research seeks to answer the question, what is the relationship between school leadership and professional learning with the mediation of teachers' collective effectiveness and adjustment of uncertainty avoidance?

Theoretical foundations and research background

Professional learning: It is a process in which individuals, without the help of others, take the lead in identifying learning needs, setting learning goals, determining material and human resources for learning, choosing and implementing appropriate learning strategies, and evaluating organizational skills (Foroutani, 2018). Professional learning as a complex, dynamic, and reflective activity enables the teacher to face rapid changes (Kulophas & Hallinger, 2020; Geijsel et al., 2014). They pay attention to the concept of professional learning of the school teacher as a learning community and emphasize informal and formal collaborative development and career learning. Other studies consider teacher learning to be influenced by colleagues and job contexts. In teacher learning based on the job context, they provide conditions for teachers to focus and relate their learning to the students, and colleague-based learning acts as a source of contextual knowledge and feedback (Opfer & Pedder, 2011). Professional learning of teachers emphasizes the participation and development of teachers through the creation and development of learning communities in the school (Talebizadeh, Hosseingholizadeh, & Bellibaş, 2021; To et al., 2021; Hosseingholizadeh, Amrahi & El-Farr, 2020).

School leadership:

Leadership is one of the most important factors in achieving organizational success (Todt et al., 2019). School leadership refers to the responsibility of principals to unite teachers and hold them accountable for their participation (Vanblaere & Devos, 2018). The role and position of school principals as educational supervisors and individuals influencing various educational and instructional processes of the school in improving the quality of the school is not hidden from anyone. School managers are actually managers of school processes, and aligning all curricular, educational, and educational factors and elements of the school is one of their inherent and organizational duties (Mohammadi Jorjaghaki, 2021). In the meantime, one of the most stable and important leadership models is educational leadership; this model focuses on improving teaching and student learning (Bush, 2014). Educational leadership, in the sense of a model, specifically refers to leadership to improve education and learning. At the global level, experts in educational management and leadership believe that educational leadership is a useful tool for creating an effective teaching and learning environment (Sleegers et al., 2004) and focuses on increasing teachers' capacities for effective teaching and thus improving student learning (Dianat et al., 2023). The researchers recommend that the principals of primary schools adopt the educational leadership style to improve the effectiveness of teachers and finally the performance and academic progress of students (Ahmad Tomas & Hamid, 2020).

Collective efficacy of teachers:

Albert Bandura introduced the idea of collective efficacy as an emergent variable in which members play a role in the success of society. Collective efficacy considers group success to be dependent on the relationships between group members at two levels, namely, the degree to which individuals feel able to contribute to the existing group and the degree to which individuals find a fit between their own abilities and the aspirations and goals of other group members. The collective efficiency of teachers demonstrates the level of teachers' belief in collective efforts and their participation in the teaching and academic progress of students (Valizadeh, 2021). Collective efficiency is among the factors that can create positive social processes, interactions, teamwork, participation, and adherence to social values (e.g., keeping promises and truthfulness), thus increasing school effectiveness (Shawran et al., 2012). The relationship between school leadership and collective teacher efficacy varies across cultures. For instance, countries with high power distance and collectivist tendencies show stronger correlations, suggesting that cultural factors significantly shape these dynamics (Kaya & Demir, 2022).

Uncertainty avoidance:

It refers to the tendency of employees to avoid uncertain or ambiguous situations due to discomfort (Dorfman & Howell, 1988). According to Feynman (2006), trust in the leader is a critical condition for employees who score high in uncertainty avoidance. Additionally, due to the nature of ambiguity and uncertainty, employees may need reassurance from their leaders indicating that they are on the right track. McAllister (1995) explains that if employees have affective trust, they should perceive their leaders' intellectual stimulation, individual attention, inspirational motivation, and heroic roles as genuine and hence respond positively. They will not be afraid of talking and freely exchanging ideas and problems. They know that if the idea succeeds, their leaders will appreciate them, and if the idea fails, the blame will be shifted to circumstances and other factors, but not to the person who initiated the idea. Educational leaders listen, respond constructively, and continue to support people from idea generation to idea commercialization (De Jong & Den Hartog, 2007). Employees with a high level of uncertainty avoidance tend to keep up with rules and regulations while seeking support and guidance from their managers to avoid potentially dangerous situations (Hofstede, 2011). Some studies related to the research topic are presented in the following paragraphs.

Thien & Liu (2024) investigated Linear and nonlinear relationships between instructional leadership and teacher professional learning through teacher self-efficacy as a mediator and found a significant positive linear relationship between instructional leadership and teacher-professional learning. Hao, Yu & Fu (2024) in a study titled Organizational climate of kindergartens and teacher professional learning: Mediating effect of teachers' collective efficacy and moderating effect of mindfulness in teaching found that promote teachers professional learning by enhancing their collective sense of efficacy. Özdemir et al. (2023) the effects of school leadership on teachers' educational practices, with the mediation of the collective efficacy of teachers and the adjustment of uncertainty avoidance. They reported the significant indirect effect of school leadership on

teachers' educational practices with a significant mediating role of the collective efficacy of teachers. Likewise, Dianat et al. (2023) investigated the role of educational leadership of school principals in the professional learning of teachers in Mashhad elementary schools and found that the model of educational leadership has a direct and meaningful relationship with the professional learning of teachers. Kaya and Demir (2022) also conducted a meta-analysis to analyze the relationship between school leadership and the collective efficacy of teachers in a cultural context and concluded that the power distance and long-term orientation of countries could positively predict the relationship between school leadership and the collective efficacy of teachers. Furthermore, it was revealed that uncertainty avoidance tendencies and countries' masculinity did not predict the relationship between school leadership and the collective teacher efficacy. Yin et al. (2019) examined the paths between educational leadership, teacher collective efficacy, and teacher commitment and demonstrated that educational leadership has a significant direct effect on the collective efficacy of teachers. Similarly, Saberi (2021) studied the effect of transformational leadership on professional learning through the mediation of the professional learning community among primary teachers in Chabahar, and their results revealed the direct impact of transformational leadership style on the learning community and professional learning of teachers. Moreover, Cansoy and Parlar (2018) investigated the relationship between school principals' educational leadership behaviors, teachers' self-efficacy, and teachers' collective efficacy and reported a positive and significant relationship between these factors. In addition, effective school leadership behaviors and teacher self-efficacy perceptions were positive and significant predictors of collective teacher efficacy perceptions. Wang (2018) evaluated school leadership and professional learning community in two senior high schools in Northeast China. The results confirmed that school principals are strong educational leaders and visionaries for continuous school improvements and play an important role in developing and communicating a common vision and shaping a culture of trust, support, and supervision of academic learning.

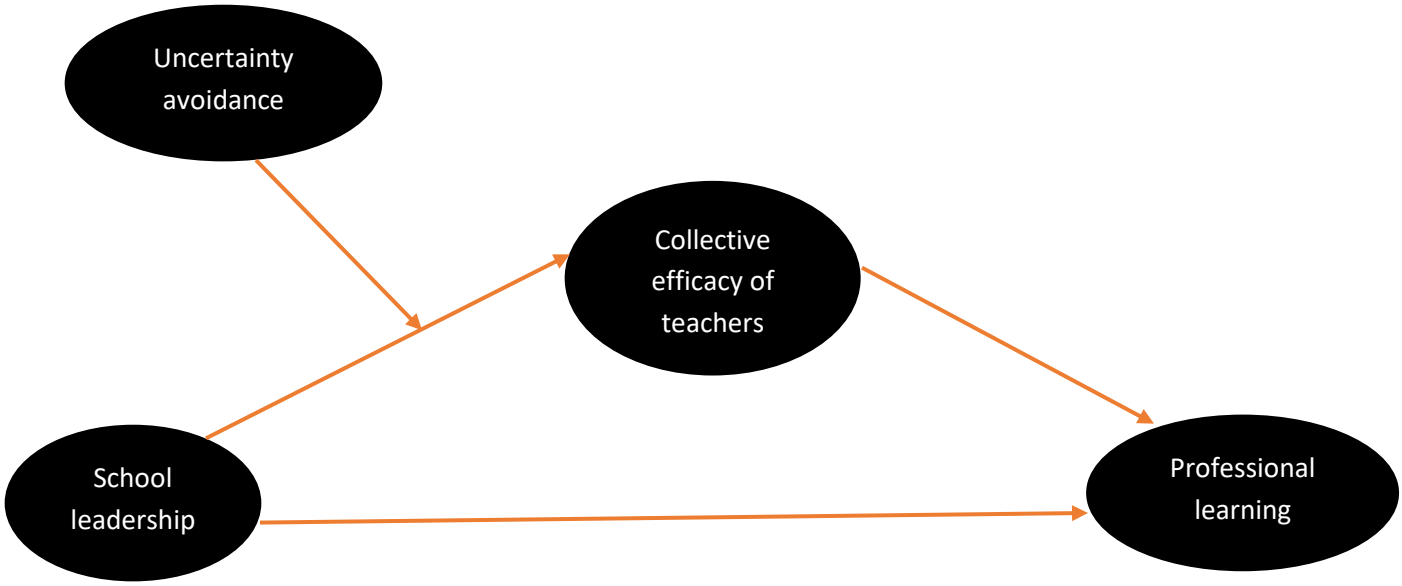

Figure 1. Conceptual research model

***Source*. Özdemir et al. (2023) and Vanblaere & Devos (2018).**

According to the stated contents and the conceptual model, the research hypotheses were as follows:

Hypothesis 1:

School leadership has an effect on the professional learning of elementary school teachers in the 2nd district of Urmia.

Hypothesis 2:

School leadership has an impact on the collective efficiency of primary school teachers in District 2 of Urmia.

Hypothesis 3:

Collective efficacy has an effect on the professional learning of primary school teachers in the 2nd district of Urmia.

Hypothesis 4:

School leadership has an impact on the professional learning of elementary school teachers in District 2 of Urmia through the mediation of collective efficacy.

Hypothesis 5:

Uncertainty avoidance has a moderating role in the relationship between school leadership and the

collective efficacy of primary school teachers in District 2 of Urmia.

Methods

This research is applied descriptive-correlational in terms of purpose and method, respectively, and is of structural equation modeling type that examines the direct and indirect effects of variables and falls within the scope of causal modeling research. The statistical population of the present research included all the primary school teachers of the 2nd district of Urmia (N = 1285). Based on the statistical population, the statistical sample size was 296 using Cochran's formula. However, to ensure data saturation, the questionnaires were distributed among 315 people, and finally, 306 correct questionnaires were delivered to the researcher. The cluster sampling method was used in this study. The School Leadership Questionnaire (Vanblaere & Devos, 2018) with 15 items, the 7-item Professional Learning Questionnaire (Yin et al., 2019), the 16-item Collective Efficacy of Teachers Questionnaire (Goddard et al., 2000), and the 5-item Uncertainty Avoidance Questionnaire (Yoo et al., 2011) were utilized for data collection. The questionnaire questions were rated on a five-point Likert scale (1 = strongly disagree), (2 = disagree), (3 = no opinion), (4 = agree), and (5 = strongly agree). The face and content validity of the research tools were confirmed by the supervisors, and confirmatory factor analysis was used to check the construct validity of these tools. The results showed that the factor loadings of the items of each of the research tools were above 0.3, implying that they had appropriate validity.

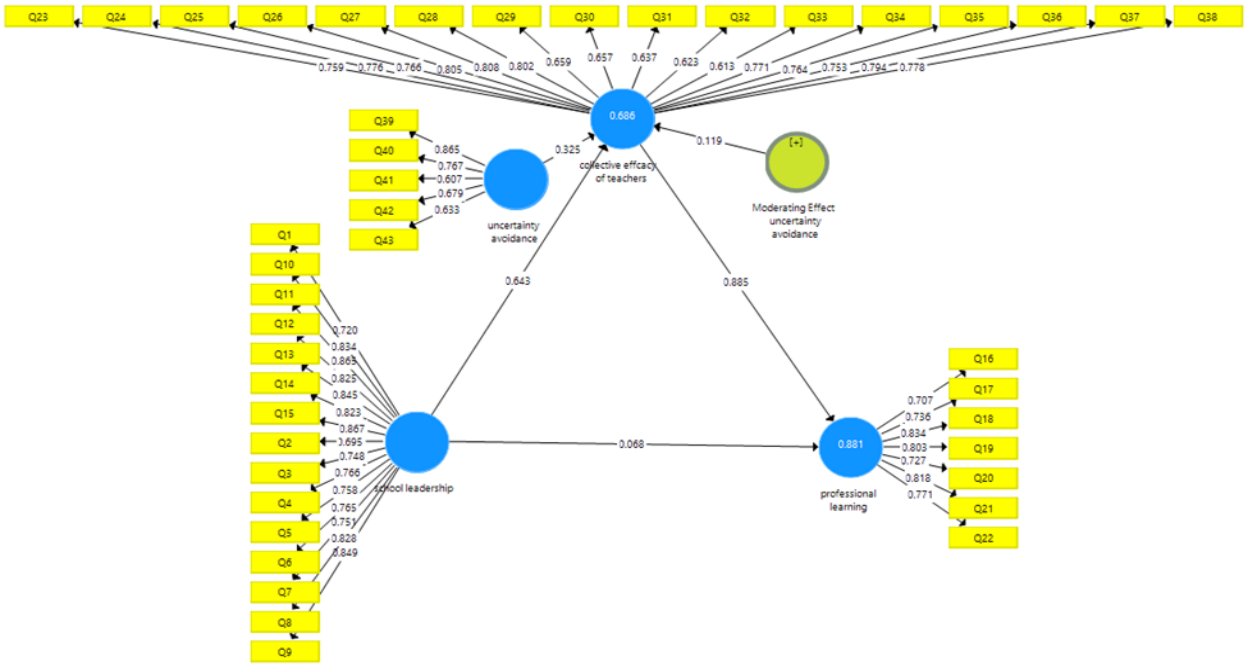

Figure 2. Factor load values of research variables

Cronbach's alpha coefficients were calculated to evaluate the reliability of the research tools (Table 1).

Table 1. Cronbach's alpha coefficients of research variables

Variables	Number of items	Cronbach's alpha coefficients
Uncertainty avoidance	5	0.84
School leadership	15	0.96
Collective efficacy of teachers	16	0.94
Professional learning	8	0.91

Findings

The obtained data were analyzed through structural equation modeling. First, the normality of the variables was checked through the Kolmogorov-Smirnov (K-S) test. Considering that some variables were non-normal, the partial least squares regression method was used to model structural equations. The demographic characteristics of the studied samples are presented in Table 2.

Table 2. Demographic characteristics of the studied samples

Demographic characteristics		Abundance	Abundance percentage	Demographic characteristics		Abundance	Abundance percentage
Gender	Female	236	77.1	Service history	1- 5years	99	32.4
	Male	70	22.9		6-10 years	53	17.3
Marital status	Single	73	23.9		11-20 years	46	15
	Married	233	76.1		21-25 years	35	11.4
					Over 25 years old	73	23.9

Based on the results, more than 77% of the respondents were female, and about 76% of them were married. The service experience of 1-5 years with about 32% was the most frequent among the respondents.

Table 3. Means and standard deviations of research variables

Variables	Average	Standard deviation	Crookedness	Standard error of the deviation
Uncertainty avoidance	4.25	0.04	1.06	0.13
School leadership	3.60	0.05	0.43	0.13
Collective efficacy of teachers	3.50	0.05	0.12	0.13
Professional learning	3.72	0.05	0.45	0.13

Based on the data (Table 3), the highest (4.25) and lowest (3.50) means were related to uncertainty avoidance and teachers' collective efficiency, respectively. Considering that the correlation matrix is the basis of the analysis of the path analysis model, the correlation relationship of the research variables was examined before performing the structural equation model (Table 4).

Table 4. Correlation matrix of research variables

Variables	1	2	3	4	Significance level
School leadership	1				*******
Professional learning	0.707**	1			0.000
Collective efficacy of teachers	0.738**	0.867**	1		0.000
Uncertainty avoidance	0.379**	0.513**	0.498**	1	0.000

The correlation coefficient between research variables was positive and significant. The intensity of this correlation ranged from 0.379 to 0.867. The highest correlation coefficient was related to teachers' collective efficiency with professional learning (r = 0.867), while the lowest correlation coefficient belonged to uncertainty avoidance and school leadership (r = 0.379).

The extracted average indicators, combined reliability, and Cronbach's alpha were used to evaluate the measurement indicators and validity of the model. The results revealed that all the obtained values were higher than the desired level.

Table 5. External model fit indices

Research variables	Cronbach's alpha	Composite reliability	Average variance extracted
Uncertainty avoidance	0.849	0.892	0.625
School leadership	0.936	0.967	0.661
Collective efficacy of teachers	0.950	0.956	0.575
Professional learning	0.912	0.930	0.655

SRMR and NFI indexes were used for the overall fit of the research model. The appropriate values of these indexes were less than 0.08 and above 0.9, respectively. In this research, the values of the SRMR and NFI indexes were 0.066 and 0.96, respectively, demonstrating that the research model had a good fit.

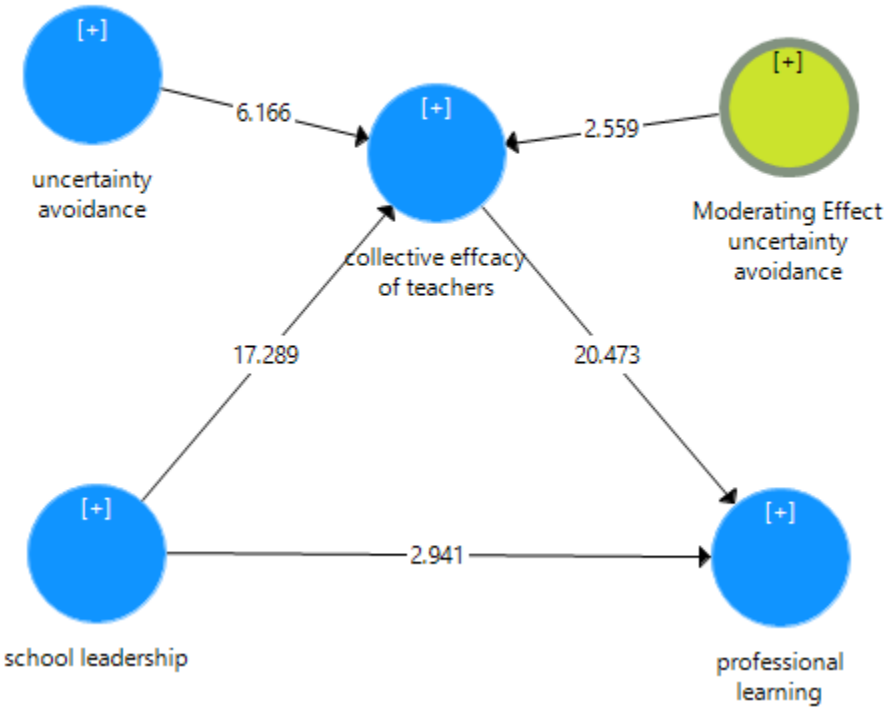

Figure 2. Research model in the mode of significant numbers and standard estimation

As shown, the numbers marked on the arrows indicate T-values. To test the hypotheses at the 95% confidence level, values greater than and equal to the absolute value of 1.96 imply that there is a significant relationship between the two variables.

Table 6. The results of the research hypothesis test

Hypotheses	Standardized coefficients	The value of the T statistic	Meaningful	Result
School leadership on professional learning	0.068	2.941	0.000	Confirmation
School leadership on the collective efficacy of teachers	0.643	17.281	0.000	Confirmation
Collective efficacy of teachers on professional learning	0.885	20.473	0.000	Confirmation
School leadership on professional learning with the mediating role of collective efficacy of teachers	0.496	13.458	0.000	Confirmation
The effect of school leadership on the collective efficacy of teachers with the moderating role of uncertainty avoidance	0.119	2.559	0.000	Confirmation

Discussion and conclusion

Professional learning represents the need of professionals to learn more while working and progressing in their profession and as a collective capacity based on cognitive and experimental processes. The present research identified the most important factors affecting the professional learning of teachers and tested the influence of these factors on professional learning and the collective efficiency of teachers. The findings confirmed that school leadership has a direct and significant effect on professional learning and explains 7% of professional learning, which is consistent with the findings of Thien & Liu (2024), Özdemir et al. (2023), Dianat et al. (2023), Saberi (2021), and Wang (2018). principals' influence on school effectiveness operates indirectly through mediating variables via teachers' attitudes and behaviors to create conditions that shape effective teaching and learning processes in the school (Nadav, Benoliel & Schechter, 2025). Considering that school leadership refers to administrators' responsibility to unify teachers and hold them accountable for participating in learning, teachers can take responsibility for their own learning and that of their students.

The results of the second hypothesis demonstrated that school leadership has a positive and significant effect on the collective efficiency of school teachers, and 64% of teachers' collective efficiency was influenced by school leadership, which conforms to the results of studies performed by Hammad et al. (2024), Özdemir et al. (2023), Kaya and Demir (2022), Yin et al. (2019) and Cansoy and Parlar (2018). The principals of primary schools should adopt the educational leadership style to improve the effectiveness of teachers and finally the performance and academic progress of students (Ahmad, Thomas, & Hamid, 2020). principals' leadership behaviors can influence collective efficacy by increasing the opportunities for teachers to work collaboratively around improving teaching and learning (Goddard et al., 2021). If we consider school leadership as a process in which a group of people is influenced by a leader to achieve a common goal, it can be expected that it will lead to a shared group belief in the shared abilities among teachers to organize and implement the required

courses to create certain levels of achievements and performance.

According to the results of the third hypothesis, collective efficiency had a positive and significant effect on teachers' professional learning and could explain 88% of the variance of teachers' professional learning, which corroborates with the results of Hao, Yu & Fu (2024), Özdemir et al. (2023), Valizadeh (2021), and Vanblaere & Devos (2018). In practice, professional learning of teachers can be facilitated by creating an open organizational climate and improving their ability to perceive the collective (Hao et al., 2024). In collective efficacy, a group of teachers with high levels of efficacy are more likely to cope with the challenges they face in teaching their students; thus, teachers can take responsibility for achieving high-quality student learning. Collective efficiency among teachers creates teamwork interactions and better learning, ultimately leading to the academic success of students.

According to the results of the fourth hypothesis, the indirect effect of school leadership on professional learning through the mediation of teachers' collective efficacy is significant. This finding replicates the conclusions of previous studies that the effects of leadership on teaching are mostly achieved indirectly (Özdemir et al., 2023 ;Thoonen et al., 2011). Teachers' collective efficacy refers to their ability to collaborate, exchange ideas, and draw on each other's experiences. When school leadership is able to create an environment in which teachers feel connected to and can learn from each other, their collective efficacy increases. This collective efficacy, in turn, enhances teachers' professional learning because they can draw on each other's skills and knowledge.

Finally, the results of the study show that uncertainty avoidance as a moderating factor can enhance the impact of school leadership on teachers' collective efficacy. In other words, the more school administrators can reduce uncertainty and create a safe and stable environment, the greater the positive impact of leadership on teachers' collective efficacy. This highlights the importance of paying attention to the psychological and social dimensions of leadership in educational processes. While this finding echoes previous research suggesting that cultural aspects such as power distance shape the effects of leadership on teacher learning (Shengnan & Hallinger, 2021) and teacher practices (Bellibaş et al., 2022) .in high uncertainty-avoidant cultures, school principals who set clear directions, build positive relationships among teachers, link school structures and procedures with goals, and improve the instructional program could foster teachers' sense of collective efficacy, which in turn engages teachers in improving their instructional practices to better meet students' learning needs. Although influential leadership scholars have long called for refined attention to identifying the boundary conditions that might shape the effectiveness of school leadership practices (Özdemir et al., 2023). Low uncertainty avoiders embrace change and novelty, challenging norms with a spirit of adventure. Conversely, high uncertainty avoiders exhibit conservatism, fear failure and risk, and prefer security over the unknown (Qu & Yang, 2015). The influence of leaders on subordinates' attitudes and behaviors is moderated by uncertainty avoidance (Zhou & Song,

2020). employees with low uncertainty avoidance are more inclined to perceive risks and uncertainties as opportunities, enabling them to engage in continuous learning and exploration (Martín et al., 2020). Therefore, to enhance teachers' collective effectiveness, school administrators should actively focus on reducing uncertainty. Creating an environment where teachers feel safe and trusting will not only strengthen their teamwork, but also improve the quality of teaching and learning.

Professional learning is a powerful tool in today's changing and complex world, where the quality of education heavily relies on teachers' opportunity to continuously renew their knowledge and professional skills throughout their careers. Teachers are expected to be thinkers, questioners, and conceptualizers who participate in creating and sharing new knowledge to develop new teaching methods and take responsibility for achieving high-quality student learning. The school leadership plays a significant role in the realization of this mission, and school leaders must provide an atmosphere of care and trust among teachers, along with a respectful attitude toward interacting with students, in order to promote group or collective learning based on active deconstruction of knowledge through reflection and analysis. The structure of schools should be improved for collaborative decision-making, and the teacher's independence should be considered for decision-making. Therefore, it is suggested that school administrators create a positive spirit among teachers and students by providing encouraging and supportive educational environments and consider the existence of an open and reliable environment in professional learning.

To stimulate professional learning, teachers should be involved in decision-making processes. Teachers benefit from each other's knowledge and skills through mutual consultation, collective decision-making, and information exchange.

Finally, teacher training centers should include measures to strengthen and increase teachers' beliefs in their programs, and people who are trained for this profession should be aware of the complexities of the teaching profession. Moreover, training should lead teachers toward collective efficiency in the teaching profession.

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