



Presentation of the Professional Development Model of Elementary Teachers in Kurdistan Province

Latifa Rastegar¹, and Hasan Ghalavandi^{2*}

1. PhD Student, Department of Educational Management, Faculty of Literature and Humanities, Urmia University, Urmia, Iran. Email: l.rastegar@urmia.ac.ir
2. Corresponding author, Professor, Department of Educational Management, Faculty of Literature and Humanities, Urmia University, Urmia, Iran. Email: h.ghalavandi@urmia.ac.ir

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ABSTRACT

Objective: This study aims to present a comprehensive professional development model for elementary school teachers in Kurdistan Province, Iran.

Method: The study adopted an exploratory sequential mixed-methods design. In the qualitative phase, content analysis of expert interviews yielded 104 open codes grouped through theoretical saturation into six main categories. In the quantitative phase, a researcher-developed questionnaire was distributed to 150 elementary teachers selected via simple random sampling. Confirmatory factor analysis and structural equation modeling using SmartPLS were employed for data analysis.

Results: Confirmatory factor analysis demonstrated robust model fit indices. Structural equation modeling confirmed significant positive path coefficients from causal factors to professional development ($\beta = 0.548, p < 0.01$), contextual factors to strategies ($\beta = 0.353, p < 0.01$), and intervening factors to strategies ($\beta = 0.531, p < 0.01$). Strategies also significantly predicted outcomes ($\beta = 0.294, p < 0.05$). However, the path from professional development to strategies was non-significant ($\beta = -0.031, p > 0.05$).

Conclusions: The findings offer targeted recommendations for educational policymakers in Kurdistan Province. The proposed model explains teachers' professional development through six main categories and eighteen subcategories, providing a comprehensive framework for designing effective professional development programs.

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Introduction

In the past decades, developed and developing countries have faced many ups and downs in political, economic, cultural, and educational fields (Wang et al., 2014). In the face of many potential future challenges, the educational system is considered an essential asset in the effort to achieve development goals, and the education system is the most important tool available to advance and realize the ideals of every nation (Marouf & Alimoradi, 2017). The mission of education is to empower people to fully develop their talents and realize their creative potential, and this goal is more sublime than any other. Achieving this goal, although difficult and long, is an essential contribution to the search for a more just and better world to live in (Conradty & Bogner, 2020).

In today's world, the capability, economic power, and welfare of any country depend on the optimal use of its facilities, industries, and human resources. Education and training are faced with the increasing growth of knowledge, information, and new technologies; therefore, education and training need people to be able to adapt to new conditions. In the meantime, without a doubt, teachers as human resources in education and training are one of the most important elements that make up educational environments and the most important factor in creating a favorable situation in achieving educational goals (Haug & Mork, 2021). Teachers are responsible for guiding and nurturing a generation in society, and all individual and collective efforts of teachers are aimed at improving student learning and success. Today, fundamental steps have been taken to develop and empower teachers, and special attention has been paid to the needs and desires of teachers so that teachers can succeed in today's changing world (Ketelhut et al., 2020).

The value and importance of human resources as capital and investment in the field of human resource training in society is considered the best type of investment and has been the focus of great experts and economists since the second half of the twentieth century. Toshio Doko, a prominent figure in modern Japan, emphasized the critical importance of human resources and education by stating that Japan lacks natural resources and military power, and its only resource is the inventive capacity of its people. He argued that this resource must be continuously educated, trained, and developed, as it will become the most valuable asset of humanity (Lassibille, 2016).

Today, the issue of quality is one of the main issues in the planning and development of educational systems. From the perspective of total quality management and other standards such as ISO, quality means customer or client satisfaction. The role of the human factor in the design and implementation of organizational systems and processes and the importance of human resources in development programs are so great that today human resources are considered the main axis of development and education has a special place as the system and main engine of humanization and training (Huang et al., 2024).

Naturally, for a large and extensive organization such as education and training itself, human resources are a determining factor in designing and implementing development programs, and development programs in this huge organization are organized and implemented with limited human resources. Paying attention to human resources in education and training, and especially paying special attention to the "teacher" as the main factor in human development, is considered the focus of discussion on efficient and effective education and training. Therefore, static and linear teacher training programs do not meet the professional needs of teachers, and it is imperative that these programs be replaced with comprehensive, complete, and dynamic programs (Morina et al., 2025). For the 21st century, teachers have been described as "experts in effective learning." Such a teacher, with the ability to think deeply

and critically, reflects on the gifts and values of education and curricula, and is eager to motivate and encourage individual students (Ketelhut et al., 2020).

One of the factors that is very important in relation to teachers and has a very important impact on the progress of teachers is the professional development of teachers. Professional development is a continuous process of group and individual training that empowers teachers individually, in groups, and even in the form of professional associations to be able to make complex decisions and also to be able to identify and solve problems and establish a connection between theory and practice in the field of student outcomes. Therefore, the purpose of professional development of teachers is a continuous process for teacher education and training during which the knowledge, insight, and skills of teachers are increased, so that they can work as professional teachers in the field of education (Shahsoni et al., 2023).

In other words, since teachers play the most important and central role in the development, implementation, and evaluation of the curriculum in the classroom (Hunkins & Ornstein, 2016), teacher training and professional development contribute to the development of students. In other words, trained and experienced teachers teach their students a lot of knowledge and skills with less difficulty. Teacher professional development covers a wide range, and professional development requires continuous learning from teachers. In practice, professional learning will not be possible in the short term, but rather, teacher professional development is a long-term process that includes teacher education in universities, in-service courses during employment, and even their individual studies and research (Ketelhut et al., 2020).

Also, in professional development, teachers as agents of change, individually and with the help of each other, examine, renew, and expand their commitments to the scientific and ethical goals of teaching, or they will have a critical perspective on improving their knowledge and information levels and improving their skills so that they can think, plan, and practice professionally with students, teaching without problems. Therefore, it can be said that one of the most effective methods for empowering staff is professional development programs, and a continuous and high-quality professional development program plays an important role in developing teachers' thinking and their effectiveness in teaching and learning (Bengesi et al., 2024).

Gable and Burns propose three models of professional development: standard professional development, school-based professional development, and professional development. They stated that the constant desire and tendency to change is a clear need of teachers, and this cannot be achieved unless the connection between teachers' cognition, beliefs, and knowledge is established with changing events (Mai et al., 2022). Mishra and Koehler's model also shows that a teacher's knowledge about the content of teaching includes pedagogical knowledge, pedagogical content knowledge, and technological knowledge, where pedagogical knowledge is the teacher's deep knowledge about the processes, approaches, and methods of teaching and learning. Educational content knowledge is the knowledge of using pedagogical approaches and methods to teach subject matter, and technological knowledge is about the methods of using technology in teaching (Tan et al., 2025).

Studies have shown that teacher professional development leads to changes in teaching methods and improves student learning outcomes (Sims et al., 2025). In recent years, the literature on teacher professional development in the field of school reform and empowerment has been based on the belief that the main cause of student learning and success is teacher effectiveness (Haug & Mork, 2021). On the other hand, the results of

research conducted in this field have shown that a continuous and high-quality professional development program plays a very important role in developing teachers' thinking and their effectiveness in teaching and learning (Ketelhut et al., 2020). Therefore, the success of efforts in the field of education improvement requires professional development and increasing teachers' knowledge and skills. In order to achieve learning goals, teachers must improve their professional skills and expertise in addition to following educational standards (Mishra & Koehler, 2006).

Dadger et al. (2025) demonstrated that teacher professional development enhances teaching skills, boosts motivation and self-confidence, and ultimately improves student learning outcomes. Mohammadi et al. (2024) reported that professional development programs not only strengthen teaching skills and professional competencies but also positively impact teachers' motivation and morale. Bagheri et al. (2024) confirmed that teacher professional development is a key factor in improving teaching and learning quality in elementary schools, and Mohammadi et al. (2024) emphasized the need for continuous professional development programs within educational systems to introduce teachers to modern teaching methods and digital tools. International studies also showed that Mbunda et al. (2025) highlighted effective strategies for supporting teacher professional development, including timely study leave, encouraging participation, and assisting teachers in accessing suitable educational institutions and materials. In contrast, restrictive academic leave policies, threatening language, favoritism, and lack of cooperation hinder progress. Morina et al. (2025) found that collective participation in professional development positively impacts classroom outcomes. Studies using control group designs reported smaller effect sizes on teacher-level outcomes compared to those using within-subjects designs. Antoniou et al. (2025) examined teaching skills through the lens of the dynamic model of educational effectiveness, categorizing them into five types of teacher behavior. These range from direct teaching skills to advanced skills related to innovative educational approaches and differentiated instruction. Reyes et al. (2025) concluded that teachers' professional development is influenced by their experiences, particularly when content is relevant to their local context. Teachers applied their learning in classrooms, increasing student awareness of changes and fostering collaborative projects. Edo (2025) noted that teacher professional development programs face challenges such as inadequate funding, limited training time, poorly designed program structures, and insufficient institutional support.

Meanwhile, in the education system of any country, including Iran, elementary education and upbringing has a great position, sensitivity, and importance. Most developed countries have concluded that investing in elementary education is the basis of all-round development. Even many low-income countries have realized that priorities in education should be focused on elementary education, and this has become so important that the average increase in government resources allocated to elementary education in some countries has reached about twenty percent in a five-year period.

Therefore, given that the professional development of teachers is one of the main needs of education and, on the other hand, the elementary school is considered the foundation of general education and plays an important role in the country's educational system, and its training and evaluation are important and necessary, this study seeks to provide a comprehensive model for the professional development of elementary school teachers in Kurdistan Province.

Method

Research Design and Approach

This study adopts an applied research approach and employs an exploratory sequential mixed-methods design, integrating qualitative and quantitative phases for data collection. The qualitative phase focuses on developing the theoretical framework by utilizing both documentary and survey (field) methods. In the documentary method, relevant literature, including articles, books, journals, scientific research papers, theses, and online resources, was reviewed to establish the theoretical foundations, compile prior research, and develop questionnaire tools. In the quantitative phase, data from the qualitative phase informed the design of a researcher-developed questionnaire distributed to a sample of the target population. Data analysis was conducted using descriptive and inferential statistical methods with SPSS and PLS software.

Data Collection Tools

To identify predictors of professional development for elementary teachers, improvement strategies, and their consequences, this study utilized a library-based approach, reviewing credible sources such as books, scholarly articles, and other relevant materials. The research was conducted in two phases - qualitative and quantitative - described separately below.

Sampling Procedures

Given the broad range of variables related to predictors of professional development, improvement strategies, and their outcomes, the study population in the quantitative phase consisted of elementary school teachers in Kurdistan Province. A simple random sampling method was used to select the sample. Data were collected using a questionnaire distributed in three formats: online, in-person, and via correspondence to the statistical sample.

Sample Size, Power, and Precision

The intended sample size was 150 elementary school teachers, and the achieved sample size matched the intended sample size. The sample size was determined based on the requirements of structural equation modeling (SEM) using the partial least squares (PLS) approach, which recommends a minimum sample of ten times the number of indicators or at least 100 participants for stable parameter estimates. A sample of 150 teachers was thus deemed sufficient to achieve adequate statistical power and precision of parameter estimates.

Mixed Methods Research

Mixed methods research was appropriate for this study because the research goals required both an in-depth exploration of the professional development phenomenon (qualitative) and the validation of the resulting model through statistical inference (quantitative). The study employed an exploratory sequential mixed-methods design, in which qualitative data collection and analysis precede quantitative data collection and analysis. The qualitative

approach to inquiry was grounded theory, and the quantitative design was a cross-sectional survey with structural equation modeling. The rationale for collecting both qualitative and quantitative data was that the qualitative phase generated the theoretical model and identified categories and subcategories, while the quantitative phase validated the relationships among these categories. Integrating the findings from the two datasets provided insights that neither approach alone could yield.

Data Analysis

Descriptive Statistics: Based on the results obtained in the present study, in the statistical sample of teachers, it was 52% and 48% for men and women, respectively. Also, 42% of people have a bachelor's degree, 54% have a master's degree, and 4% have a doctorate. Among the members of the statistical sample of the research in the group of teachers, it can be seen that 10% of them have less than 5 years of experience, 16% have 5 to 10 years of experience, 28% have 11 to 15 years of experience, 20% have 15 to 20 years of experience, and 26% have more than 20 years of professional experience.

Inferential Analysis: To validate the teacher professional development model, confirmatory factor analysis was applied to the main and subcategories derived from identified open codes. A questionnaire, based on these codes and structured as a 5-point Likert scale, was administered to teachers to assess the importance of these indicators in their professional development. The results were analyzed using first- and second-order confirmatory factor analysis with the maximum likelihood method. Table (1) presents the results of this analysis for the identified subcategories.

Results

Descriptive Statistics

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Inferential Analysis

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Table 1. results of first-order confirmatory factor analysis in line with model validation

Subcategory	open codes (index)	factor load	t-statistic	p-value
Curriculum	1. Curriculum based on talent development	1	-	-
	2. Coordination between planned and implemented curriculum	1.251	9.140	0.0001
	3. Compatibility of the curriculum	1.371	9.656	0.0001
	4. Curriculum based on interaction with stakeholders	1.451	9.699	0.0001
	5. Eliminate redundant curriculum	1.144	9.019	0.0001
	6. Effectiveness of the curriculum	1.025	9.545	0.0001
	7. Fixing the weaknesses of the curriculum	1.095	8.845	0.0001
	8. Content update	1.381	9.724	0.0001
	9. Skill-oriented curriculum	1.362	9.677	0.0001
mission orientation	10. Moving towards the education of the third millennium	1	-	-
	11. Creating a new movement in teacher training	1.891	8.682	0.0001
	12. Attention to the influential elements in education	1.580	8.287	0.0001
	13. Attention to the real functions of the teacher	1.536	7.737	0.0001
	14. Preventing the wastage of human resources	1.286	8.060	0.0001
	15. Change in the approaches of education and upbringing in the face of the new conditions of the society	1.426	8.053	0.0001
	16. Becoming more specialized in the field of teacher training	1.953	8.511	0.0001
Job factors	17. Organizational leadership	1	-	-
	18. job satisfaction	0.969	7.495	0.0001
	19. Teamwork development	1.070	7.890	0.0001
	20. Career dynamics	1	7.271	0.0001
	21. Involving teachers in decisions	1.156	7.917	0.0001
	22. Accurate knowledge of students	0.847	7.836	0.0001
	23. Full knowledge of course content	0.886	6.740	0.0001
Response to needs	24. The need for competent teachers	1	-	-
	25. Cultural changes	1.013	10.752	0.0001
	26. The existence of an analytical approach	0.949	11.174	0.0001
	27. Attention to the real needs of students	0.938	10.238	0.0001
	28. Need to be up to date	0.580	9.297	0.0001
	29. The need for rejuvenation	0.441	7.676	0.0001
Knowledge development	30. The important position of talent management	1	-	-
	31. Use of talent area in resource management	1.307	9.909	0.0001
	32. Attention to focal competencies	1.515	9.750	0.0001
	33. The role and place of skill and ability in the professional development of teachers	1.451	9.499	0.0001

Personal development	34. Talent orientation of teachers	1	-	-
	35. Using different platforms in guiding and improving the personal development of teachers	0.829	10.570	0.0001
	36. Attention to the individual characteristics of teachers	1.144	10.979	0.0001
	37. Individual planning in professional development	0.704	10.257	0.0001
Efficient training	38. Using up-to-date and efficient knowledge	1	-	-
	39. Codified planning based on the latest findings	0.912	8.674	0.0001
Mixing the person with the job	40. Management of teachers' information and communication	1	-	-
	41. Pre-service training	0.876	9.256	0.0001
	42. Modeling experienced professors and spiritual and material support	1.052	9.393	0.0001
	43. Providing facilities for teachers to produce content	1.019	9.539	0.0001
	44. Organizational atmosphere governing the school	0.973	9.307	0.0001
	45. Providing opportunities for growth and prosperity	1.067	9.542	0.0001
	46. Providing job satisfaction for teachers	1.050	9.424	0.0001
Comprehensive use of people's capabilities	47. Policies and process	1	-	-
	48. Talent search right at the elementary level	1.177	5.332	0.0001
	49. Development and improvement and maintenance of professional teachers	1.543	5.757	0.0001
	50. Managers' attention to teachers' creativity, innovation and perseverance during teaching and training	2.134	5.874	0.0001
Enhancing knowledge	51. Up-to-date information globally	1	-	-
	52. Up-to-datedness of virtual networks for the use of teachers	1.439	7.103	0.0001
	53. Using the experience of experienced teachers and combining it with the ideas and creativity of novice teachers	1.707	7.292	0.0001
	54. Training needs assessment performance management	1.655	7.081	0.0001
	55. More public relations through meetings, virtual groups	1.317	6.575	0.0001
Educational facilities	56. Development of space and educational facilities	1	-	-
	57. Providing the necessary platforms	0.864	7.674	0.0001
	58. Attention to facilities and platforms	1.009	8.807	0.0001
	59. Providing infrastructure	0.893	8.438	0.0001
	60. Consider strengths and weaknesses	0.908	8.197	0.0001
	61. Increasing the field of competition among teachers	1.169	9.134	0.0001
	62. Considering abilities and limitations	0.889	7.996	0.0001

Organizational learning	63. In-service training of employees	1	-	-
	64. Decentralization	1.002	7.766	0.0001
	65. Self-study	1.294	7.309	0.0001
	66. Holding an educational workshop based on the achievements of professional teachers	1.455	8.051	0.0001
Independence of schools	67. Reducing politicization	1	-	-
	68. Budget allocation	0.822	9.896	0.0001
	69. Proper space construction	1.054	10.949	0.0001
	70. self-assessment	0.816	9.133	0.0001
	71. Professional management of teachers in school	0.855	10.115	0.0001
	72. Use of specialist forces	0.956	9.595	0.0001
	73. Selection of project managers	0.829	9.272	0.0001
Validation and evaluation	74. Implementation measures of the plan	1.044	10.728	0.0001
	75. Creating an evaluation system	1	-	-
	76. Attention to responsive evaluation	1.017	10.838	0.0001
	77. Attention to monitoring and evaluation	0.770	9.799	0.0001
	78. Compilation of standards	1.155	11.551	0.0001
	79. Follow-up evaluation	1.031	10.929	0.0001
	80. Target community monitoring	0.761	9.82	0.0001
Knowledge management	81. Development of evaluation models	1.201	12.315	0.0001
	82. High experience	1	-	-
	83. University education	1.084	10.375	0.0001
	84. The ability to maintain and absorb effective interactions, knowledge of the work environment	1.033	9.132	0.0001
	85. Having updated information	1.367	11.024	0.0001
	86. commitment	1.008	9.729	0.0001
	87. trust	1.034	9.445	0.0001
Personality characteristics of teachers	88. Responsibility of teachers	1	-	-
	89. Interested or unmotivated teachers.	0.772	8.196	0.0001
	90. lack of effort	1.144	10.298	0.0001
	91. The lack of importance of the subject	0.788	9.197	0.0001
	92. Specific personality traits	0.995	9.966	0.0001
Organizational implications	93. Effective verbal and written communication with students, teachers and school staff	1	-	-
	94. Team building and team leadership ability	0.415	7.695	0.0001
	95. Effective negotiation and agreement techniques	1.123	11.429	0.0001
	96. The skill of listening to the words of the other party	0.884	9.713	0.0001
	97. Development and implementation of practical and strategic plans and programs	1.127	11.149	0.0001
	98. Setting organizational goals and determining the distance between the current situation and the	0.935	10.742	0.0001

	desired situation with the participation of teachers, employees, students and their parents			
	99. Action based on the operational program of the school	0.801	9.901	0.0001
	100. Determining and developing the goals, vision and mission of the school	0.988	10.218	0.0001
Individual consequences	101. Development of organizational creativity in school	1	-	-
	102. Team building and creating work teams at school	1.028	10.949	0.0001
	103. Supporting students and teachers for continuous improvement in teaching and learning processes	0.923	10.354	0.0001
	104. Mastering negotiation techniques and solving organizational conflicts	0.596	8.168	0.0001

Based on the estimated factor loadings and their significance levels, all of which are below the 0.05 error threshold, each open code (indicator) significantly explains its corresponding subcategory. Thus, the first-order factor analysis confirms that the open codes are appropriately assigned to the identified subcategories. Table (2) presents the results of the second-order confirmatory factor analysis, illustrating how the main categories are explained through their subcategories.

Table 2. results of second-order confirmatory factor analysis in line with model validation

Main category	Subcategories	factor load	t-statistic	p-value
Causal factors	Curriculum	1	-	-
	mission orientation	0.736	6.686	0.0001
	Job factors	0.970	6.571	0.0001
	Response to needs	1.229	7.520	0.0001
The central category of professional development	Development of knowledge	1	-	-
	Personal development	1.255	7.334	0.0001
	Efficient training	1.141	6.323	0.0001
Background factors	Mixing the person with the job	1	-	-
	Comprehensive use of people's capabilities	0.404	4.942	0.0001
	Enhancing knowledge	0.500	5.801	0.0001
	Educational facilities	0.859	6.283	0.0001
Strategies	Organizational learning	1	-	-
	Independence of schools	1.270	4.635	0.0001
Intervening factors	Validation and evaluation	1	-	-
	Knowledge management	1.099	6.802	0.0001

	Personality characteristics of teachers	1.065	6.692	0.0001
Consequences and results	Organizational implications	1	-	-
	Individual consequences	1.047	4.132	0.0001

Based on the estimated factor loadings and their significance levels, all of which are below the 0.05 error threshold, each subcategory significantly explains its corresponding main category. Thus, the second-order factor analysis confirms that the subcategories are appropriately assigned to the identified main categories. Consequently, the teacher professional development model can be explained through six main categories and 18 subcategories. According to the validation indicators presented in Table (3), the confirmatory factor analysis demonstrates high validity, confirming that the teacher professional development model is sufficiently valid.

Table 3. validation indicators of confirmatory factor analysis

Indicator	Acceptable value	Index estimation in analysis
Chi-square statistic	-	8534.947
meaningfulness	More than 0.05	0.000
Chi-square ratio to degrees of freedom	smaller than 4	1.6306
Comparative fit index	More than 0.9	0.903
Tucker-Lewis's index	More than 0.9	0.897
Root Mean Square Estimation Error (RMSEE)	Smaller than 0.05	0.015
Root Mean Square Standard Error (RMSSE)	Smaller than 0.05	0.047

Causal Structure of Categories in Teachers' Professional Development Model

Following the validation of the teachers' professional development model, the causal structure of the identified categories was analyzed using structural equation modeling within the grounded theory paradigm. In this analysis, causal factors influencing teachers' professional development serve as the elementary independent variables. Alongside the core category of professional development, contextual and intervening factors are considered key determinants of professional development strategies. The consequences of implementing these strategies are included as the final dependent variable in the model. Figure (1) illustrates the structural model of the categories, highlighting the coefficients of influence for each category on its corresponding components within the structural equation model.

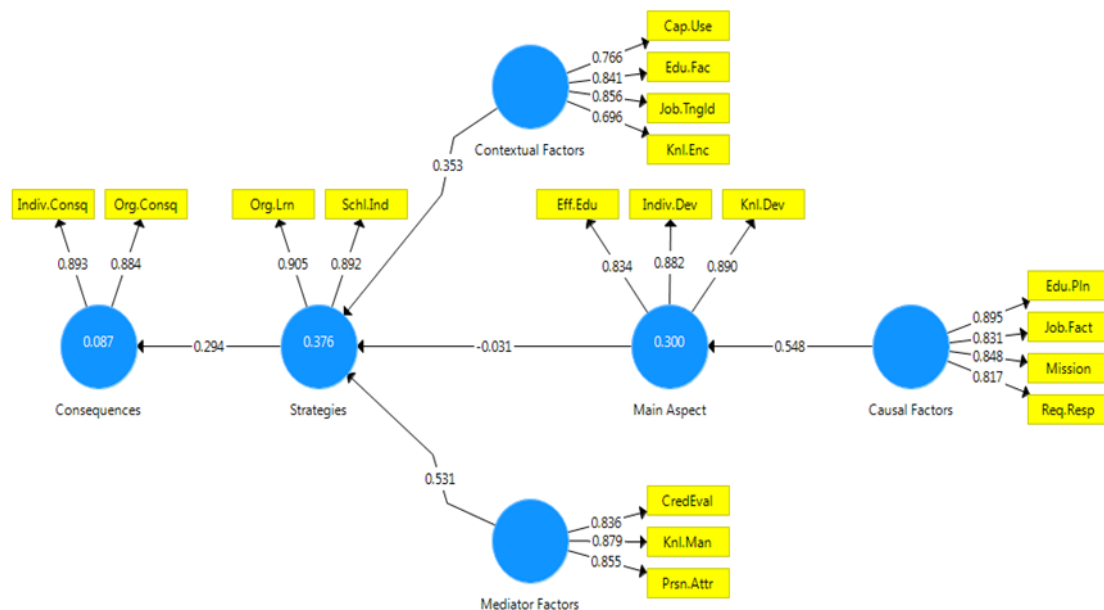


Figure 1. Structural model of the professional development of elementary teachers (standardized path coefficients)

According to Figure (1), causal factors exert a significant effect of 0.548 on teachers' professional development (the core aspect). Teachers' professional development has a slight negative impact of -0.031 on professional development strategies. In contrast, contextual factors and intervening factors demonstrate direct impacts of 0.353 and 0.531, respectively, on these strategies. Additionally, professional development strategies show a direct impact of 0.294 on the resulting consequences. To assess the significance of these effects, significance test statistics were calculated, with results presented in Figure (2).

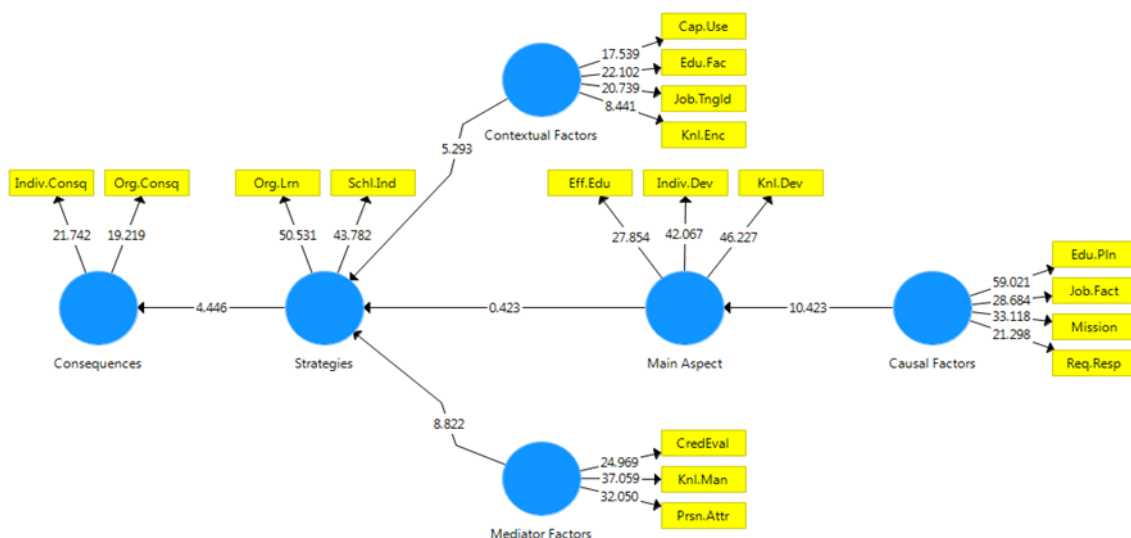


Figure 2. Significance testing of path coefficients in the structural model of elementary teachers' professional development (t-values)

According to the results shown in the graph, all tested effects in the model were significant, except for the effect of the main category of professional development on strategies. Table (4) presents the results of the significance tests for these effects.

Table 4. Significance test of the effects of categories in the model of professional development of teachers

independent variable	dependent variable	Impact factor	t-statistic	p-value
Causal factors	Professional development	0.548	10.423	0.000
Background factors	Strategies	0.353	5.293	0.000
Professional development	Strategies	0.031-	0.423	0.673
Intervening factors	Strategies	0.531	8.822	0.000
Strategies	Consequences	0.294	4.446	0.000

According to the results presented in Table 4, causal factors—comprising categories such as curriculum, mission orientation, job factors, and response to needs—have a direct and significant effect on teachers' professional development within the target population. Contextual factors, including job-person fit, comprehensive utilization of individual capabilities, knowledge enhancement, and educational facilities, also demonstrate a direct and significant impact on teachers' professional development strategies in the target population. Similarly, intervening factors—encompassing validation and evaluation, knowledge management, and teachers' personality traits—exert a direct and significant influence on these strategies. However, the core category of teachers' professional development, which includes knowledge development, individual development, and effective training, does not significantly impact professional development strategies. In contrast, professional development strategies, driven by categories such as organizational learning and school autonomy, have a direct and significant effect on the consequences of teachers' professional development in the target population. Thus, while the identified factors and subcategories of professional development do not significantly influence organizational learning strategies or school autonomy, these strategies significantly contribute to positive individual and organizational outcomes for teachers.

Discussion

The professional development model we derived for elementary teachers in Kurdistan Province rests on six categories and eighteen subcategories. Causal forces—curriculum, mission orientation, job factors, response to needs—along with contextual conditions (job-person fit, use of individual capabilities, knowledge enhancement, educational facilities) and intervening elements (validation and evaluation, knowledge management, personality traits) predicted the strategies teachers adopted. The core category itself—knowledge development, personal development, effective training—did not. That last result surprised us. We had expected the core developmental constructs to carry at least some direct weight in shaping strategy use, especially given how often they are treated as the engine of professional growth.

Our findings echo Dadger et al. (2025), who linked professional development to stronger teaching skills, greater motivation and self-confidence, and improved student learning. Mohammadi et al. (2024) similarly reported gains in teaching competence and morale, which

maps onto the individual outcomes in our model. Bagheri et al. (2024) tied such development to quality improvement in elementary schools, matching our organizational outcome category. Yet we hesitate to read these parallels as straightforward confirmation. Much of that work evaluates programs in settings with stronger infrastructure than the border villages of Kurdistan Province, where travel, materials, and staffing shortages can alter how professional development actually operates. So the overlap is real, but its meaning may differ.

International comparisons partly hold. Mbunda et al. (2025) stressed timely study leave and help accessing suitable institutions and materials. Morina et al. (2025) found collective participation improving classroom outcomes, which fits the strategic role we assigned to organizational learning and school autonomy. Antoniou et al. (2025) used the dynamic model of educational effectiveness to classify teacher behavior into five types (a taxonomy we adapted only in part), a scheme that resonates with our knowledge development and effective training components. But Edo (2025) claimed effective professional development directly shapes teaching quality—a claim our path model did not support. The highly centralized structure of Iran's education system may limit local adaptation of professional development programs, a plausible though speculative reason for the non-significant path.

Theoretically, we combined grounded theory with structural equation modeling to account for causal, contextual, intervening, strategic, and consequential dimensions at once. In the Kurdish-speaking districts of western Iran, institutional and environmental conditions appear more decisive than individual developmental components. That has practical consequences for the Kurdistan Provincial Education Directorate: supportive organizational conditions may need to precede, or at least accompany, program design. This leaves an open question: do core developmental experiences matter mainly when contextual barriers are low?

Practical Implications

Based on the findings of this study and the analysis of qualitative interviews with experts and questionnaires distributed among the studied population, the following practical recommendations are proposed for educational policymakers and administrators:

1. It is recommended that policymakers adopt national standards for teacher professional development to guide the design, evaluation, and funding of professional learning programs provided to teachers. These standards should reflect the characteristics of effective professional development identified in this study, as well as implementation benchmarks.
2. It is recommended that policymakers and school administrators evaluate and redesign school time and programs to increase opportunities for professional learning and collaboration, including participation in professional learning communities, peer mentoring, classroom observations, and collaborative planning.
3. It is recommended that the Ministry of Education, regional education organizations, and schools regularly conduct needs assessments using employee survey data to identify the areas of professional learning that are most needed and desired by educators. Data from these sources

can help ensure that professional learning is not disconnected from practice and supports the areas of knowledge and skills that educators want to develop.

4. It is recommended that administrators, in cooperation with the education organization of their region, identify and develop expert teachers as model teachers to support learning in their specialized fields for other teachers.
5. It is recommended that the Ministry of Education and professional learning districts integrate the Every Student Succeeds Act (ESSA) framework into their school improvement plans, including efforts to implement new learning standards, use student data to inform instruction, improve student literacy, increase student access to advanced courses, and thereby create a positive and inclusive learning environment.
6. It is recommended that the educational organization of the country and regions use available funds to meet the needs of rural communities and provide opportunities for inter-district and inter-school cooperation, in order to offer technology-facilitated opportunities for professional learning and coaching.
7. It is recommended that policymakers consider providing flexible funding and continuing education units for learning opportunities that include sustained participation in collaboration, mentoring, and coaching, as well as participation in institutes, workshops, and seminars.

Conclusions

This study identified a comprehensive professional development model for elementary teachers in Kurdistan Province, comprising six main categories and eighteen subcategories within the grounded theory paradigm. Causal factors (curriculum, mission orientation, job factors, and response to needs) significantly influenced teachers' professional development. Contextual factors (job-person fit, comprehensive use of individual capabilities, knowledge enhancement, and educational facilities) and intervening factors (validation and evaluation, knowledge management, and teachers' personality traits) significantly predicted professional development strategies. These strategies, driven by organizational learning and school autonomy, significantly contributed to both organizational and individual outcomes. Notably, the core category of professional development itself did not significantly predict strategies, highlighting the primacy of institutional conditions over individual developmental components in the Iranian context. Several policy recommendations emerge from these findings. First, educational policymakers should adopt national standards for teacher professional development to guide the design, evaluation, and funding of professional learning programs. Second, school administrators should redesign school time and programs to create greater opportunities for professional learning communities, peer mentoring, classroom observations, and collaborative planning. Third, the Ministry of Education and regional education organizations should conduct regular needs assessments using employee survey data to align professional learning with the actual needs of educators. Fourth, expert teachers should be identified and developed as model teachers to support learning in their specialized fields. Fifth, flexible funding and continuing education units should be allocated to support sustained participation in collaboration, mentoring, and coaching, particularly in rural and underserved communities.

Future research should address several gaps identified in this study. First, longitudinal studies are needed to examine how teachers' professional development evolves over time in response to contextual and intervening factors. Second, comparative studies across different provinces of Iran could reveal regional variations in the effectiveness of professional development strategies. Third, future research should explore the non-significant relationship between the

core professional development category and strategies through qualitative inquiry, to identify the underlying mechanisms. Fourth, intervention studies that experimentally test the proposed model's effectiveness in improving teacher and student outcomes would provide valuable evidence for policy implementation. Finally, researchers should examine the role of emerging technologies, including AI-assisted professional development platforms, in enhancing the effectiveness of teacher development programs in the Iranian context.

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CRedit authorship contribution statement

Conceptualization, L.R. and H.G.; methodology, L.R. and H.G.; software, L.R.; validation, L.R. and H.G.; formal analysis, L.R.; investigation, L.R.; resources, L.R. and H.G.; data curation, L.R.; writing—original draft preparation, L.R.; writing—review and editing, L.R. and H.G.; visualization, L.R.; supervision, H.G.; project administration, H.G.; funding acquisition, H.G. All authors have read and agreed to the published version of the manuscript.

Declaration of Generative AI and AI-assisted technologies in the writing process

The authors did not use any generative AI or AI-assisted technologies in the writing process.

Conflict of interest

The authors declare no conflict of interest.

Ethical considerations

The authors avoided data fabrication, falsification, and plagiarism, and any form of research misconduct. Informed consent was obtained from all participants, and their confidentiality and anonymity were preserved throughout the study.

Data availability statement

The data that support the findings of this study are not publicly available due to ethical considerations and the confidentiality of the participants. The data may be made available by the corresponding author upon reasonable request, subject to ethical approval.

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