EFFECTIVE TEACHER PROFESSIONAL DEVELOPMENT MODEL FOR UNIVERSITIES IN ANHUI PROVINCE[*]

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Abstract

Against the backdrop of globalization, technological advancement, and the national innovation-driven development strategy, enhancing the effectiveness of faculty professional development has become a core imperative for upgrading higher education quality in Anhui Province, China. This research aims to 1) Investigate the current effectiveness level of faculty professional development in universities in Anhui Province, 2) Conduct confirmatory factor analysis (CFA) on the structural dimensions of effective faculty professional development in these universities, and 3) Propose an effective professional development model for university faculty in Anhui Province. The sample comprises 600 full-time teachers from 6 representative undergraduate universities in Anhui Province, covering public and private institutions as well as high-level and local applied universities. The research instruments include quantitative questionnaires and semi-structured in-depth interview outlines. Data analysis employs statistical methods such as frequency, percentage, mean,

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standard deviation, and confirmatory factor analysis, supplemented by content analysis by educational administration experts.

The research results indicate that the overall effectiveness of faculty professional development in Anhui's universities reaches a moderate to high level. Confirmatory factor analysis and in-depth interview content analysis reveal that the effective professional development model for university faculty in Anhui Province is composed of 8 core factors: 1) Leadership Support, 2) Training Design, 3) Institutional Policies, 4) Assessment and Feedback, 5) Resource Availability, 6) Collaboration and Peer Learning, 7) Motivation and Engagement, 8) Technology Integration. These factors interact dynamically to form an integrated ecosystem that promotes faculty professional growth.

Keywords: University Faculty in Anhui Province, Effective Professional Development Model, Confirmatory Factor Analysis, Higher Education

Introduction

In the context of globalization, the knowledge economy, and rapid technological advancement, higher education systems worldwide are undergoing profound structural and functional transformations. Digital technologies, particularly artificial intelligence, big data, and intelligent learning systems, are reshaping teaching practices, institutional governance, and academic labor structures. Within this transformation, university teachers are increasingly required to move beyond traditional roles as transmitters of disciplinary knowledge and instead assume more complex roles as learning facilitators, curriculum designers, and creators of meaningful learning environments (Dille & Røkenes, 2021; Lytras et al., 2024). These shifts have fundamentally redefined the nature and scope of teacher professional development (TPD) in higher education.

In recent years, the Chinese government has placed teacher development at the center of national education reform agendas. A series of landmark policy documents, including Opinions on Comprehensively Deepening the Reform of the Teaching Workforce in the New Era and China Education Modernization 2035, have explicitly emphasized the strategic role of teachers in advancing educational modernization and national competitiveness (Central Committee of the Communist Party of China & State Council, 2018; Ministry of Education of the People's Republic of China, 2019). These policies have provided institutional guarantees, policy coherence, and implementation pathways for systematic faculty development in universities. The introduction of these reforms marks a fundamental shift in Chinese higher education from fragmented and remedial approaches to teacher development toward more institutionalized, strategic, and system-oriented models (Zeng, 2020).

Against this backdrop, teacher professional development has become a critical strategic resource rather than merely an individual career concern. In the global knowledge economy, where knowledge production and innovation evolve at an accelerating pace, university teachers are required to continuously update their professional knowledge, pedagogical competencies, and research capabilities to remain academically relevant and pedagogically effective (Sancar et al., 2021). Moreover, globalization has intensified cultural diversity within higher education classrooms, further demanding that teachers develop intercultural sensitivity, inclusive pedagogies, and global perspectives to support diverse student populations.

Contemporary research increasingly emphasizes that effective teacher professional development cannot be understood as isolated individual learning activities. Instead, it is embedded within broader organizational, social, and policy ecosystems. Teacher professional development is increasingly conceptualized as a dynamic ecosystem in which individual agency interacts with institutional leadership, organizational culture, peer collaboration, and resource structures

(Admiraal et al., 2021). Within this framework, sustainable teacher growth depends not only on personal motivation but also on supportive institutional environments that promote collaboration, shared responsibility, and collective learning.

Despite the growing body of international research on teacher professional development, significant contextual gaps remain. Many existing models are grounded in Western higher education systems and may not fully capture the structural characteristics, governance mechanisms, and policy environments of Chinese universities. In particular, provincial higher education systems in China exhibit substantial heterogeneity in institutional missions, resource allocation, and faculty development practices. Anhui Province, as a representative region undergoing rapid higher education expansion and transformation, provides a meaningful context for examining how institutional, organizational, and individual factors interact to shape effective teacher professional development.

Therefore, there is a pressing need to develop and empirically validate a context-sensitive model of effective teacher professional development tailored to universities in Anhui Province. Such a model should systematically integrate multiple dimensions, including leadership support, training design, institutional policies, assessment and feedback mechanisms, resource availability, collaboration and peer learning, motivation and engagement, and technology integration. By adopting a mixed-methods approach, this study aims to construct and validate an effective teacher professional development model that not only aligns with international theoretical frameworks but also reflects the institutional realities and policy contexts of Chinese higher education. Ultimately, this research seeks to provide both theoretical contributions to the literature on

teacher professional development and practical implications for improving faculty development practices in universities.

Objectives

1. To study the level of effective teacher professional development in universities in Anhui Province.

2. To study confirmatory factor analysis of effective teacher professional development in universities in Anhui Province.

3. To propose the development of an effective teacher professional development model for universities in Anhui Province.

Literature Review

1. Theoretical Evolution of Effective Teacher Professional Development Models Research on effective teacher professional development models has undergone significant evolution, shifting from fragmented skill training to systematic ecosystem construction. Early frameworks focused on remedial teaching skill enhancement (Cotta et al., 2024). , while (Boyer, 1990) "Scholarship of Teaching" elevated teaching to equal academic status with research, laying the foundation for institutionalized development. Contemporary theories emphasize holistic ecosystems, with (Prenger et al.,2019). Ecosystem Model highlighting the interplay between individual teachers, organizational environments, and external contexts. Domestically, the paradigm has transitioned from policy-driven qualification improvement to value-oriented comprehensive development (Jin, 2023)., integrating moral education, digital literacy, and interdisciplinary competence (Smolina et al.,2023).

2. The Nexus of Model Components and Professional Development EffectivenessEmpirical studies confirm the interdependence of core components in effective models. Leadership support and institutional policies act as

foundational drivers: strategic value advocacy (Iqbal et al.,2020) and reformed evaluation systems (Martin, 2002) directly shape faculty motivation. Training design and collaboration mechanisms enhance effectiveness through demand orientation (Darling-Hammond & Sykes, 2003). and peer learning communities (van Veenet al., 2025), while resource availability—especially time guarantees (Brenner et al., 2017)—and technology integration (Karaduman & Akman, 2024) serve as critical enablers(Villegas-Reimers, 2003). emphasizes that only when these components synergize can development translate into sustained teaching improvement.

3. Current Trends of Effective Models for University Faculty Recent research on university faculty professional development models exhibits three key trends. First, ecological integration: models increasingly adopt a systemic perspective, integrating organizational, community, individual, and technological dimensions (Hodges et al., 2020). . Second, contextual localization: studies focus on regional characteristics, such as Anhui's response to resource imbalance and policy implementation gaps (Nie et al., 2021; Yu et al., 2022). Third, methodological diversification: mixed-methods designs combining quantitative CFA with qualitative interviews (Shi & Wu, 2024) dominate, ensuring both statistical rigor and practical depth. Additionally, digital transformation (Hodges et al., 2020) and faculty well-being (Sabagh et al., 2018) have emerged as focal points, reflecting adaptability to global societal shifts.

Methodology

This study employed a mixed-methods research design, integrating a quantitative cross-sectional survey with qualitative semi-structured interviews to comprehensively examine the effective professional development model for university faculty in Anhui Province. The quantitative component targeted full-

time faculty members from full-time institutions of higher learning across Anhui Province. A combination of stratified and convenience sampling was adopted . Universities were first classified into three categories—Double First-Class universities, provincial key undergraduate institutions, and local applied undergraduate institutions (including private institutions). Six universities were proportionally and randomly selected from these categories. At each selected institution, administrative staff and full-time faculty members were recruited through convenience sampling, resulting in a total target sample size of 600 participants, which satisfies the recommended sample size requirements for confirmatory factor analysis (Hair et al., 2009).

Data were collected using an online questionnaire consisting of two sections: demographic information and the questionnaire comprised 90 measurement items derived from established international scales and adapted to the context of Anhui universities through literature review and expert consultation. All items were measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Content validity was assessed using the Index of Objective Consistency (IOC), evaluated by a panel of five experts, with all items meeting the acceptable threshold.

The qualitative component employed purposive sampling to conduct semi-structured interviews with nine key informants, including university administrators, faculty development experts, and frontline teachers from different institution types. The interviews focused on participants' perceptions, experiences, and interpretations of effective professional development practices. All interviews were transcribed verbatim and analyzed thematically following established qualitative analysis procedures .

Quantitative data analysis was conducted using SPSS and AMOS . Descriptive statistics were used to summarize demographic characteristics and variable distributions. Confirmatory factor analysis (CFA) was Model fit was

evaluated using multiple indices, including χ^2/df, Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), Incremental Fit Index (IFI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR).

Results

1. Descriptive Statistics

The sample was randomly selected from six full-time institutions of higher learning in Anhui Province, yielding a total of 600 valid responses (response rate = 93.75%). Among the respondents, male faculty accounted for 61.00% (n = 366), while female faculty comprised 39.00% (n = 234). In terms of educational background, the sample was highly educated: 64.00% held master's degrees and 35.00% held doctoral degrees or above, whereas only 1.00% possessed a bachelor's degree.

Regarding professional titles, lecturers constituted the largest group (44.50%), followed by associate professors (24.33%), teaching assistants (18.67%), and professors (12.50%). With respect to teaching experience, faculty with 6–15 years of experience represented the majority (52.83%), followed by those with 5 years or less (19.00%), 16–25 years (19.67%), and 26 years or more (8.50%).

In terms of disciplinary distribution, 55.33% of respondents were from science, engineering, agriculture, and medicine, while 44.67% were from humanities and social sciences. Faculty from provincial key undergraduate institutions formed the largest group (44.17%), followed by local applied undergraduate institutions (29.83%) and Double First-Class universities (26.00%). Overall, the sample demonstrates broad representativeness and aligns well with the actual demographic characteristics of university faculty in Anhui Province.

2. Correlation Analysis

Correlation analysis among Leadership Support (LS), Training Design (TD), Institutional Policy (IP), Assessment and Feedback (AF), Resource Availability (RA), Collaboration and Peer Learning (CPL), Motivation and Engagement (ME), and Technology Integration (TI) showed a significant positive<0.01, and the results of the correlation analysis showed a significant positive correlation between the different variables two by two. This indicates that each dimension maintained both relative independence and systematic correlation.

3. Confirmatory Factor Analysis

3.1 Second Order Confirmatory Factor of Leadership Support (LS)

The second-order model demonstrated good fit indices: factor loadings were 0.82 for Strategic leadership and value recognition (SLVR), 0.83 for Resource Empowerment and Condition Guarantee (RECG), 0.85 for Innovation Culture and Atmosphere Creation (ICAC), and 0.83 for Individual Care and Development Empowerment (ICDE). The model fit statistics were as follows:The model demonstrated good fit indices: $\chi^2(48) = 62.537$, $p = 0.081$; CMIN/DF = 1.303; CFI = 0.997; TLI = 0.996; IFI = 0.997; RMSEA = 0.023; SRMR = 0.018. All indices met the recommended thresholds, indicating a strong model fit. These results confirm that the model achieved both good relative and absolute fit. See Figure 1 for the model diagram.
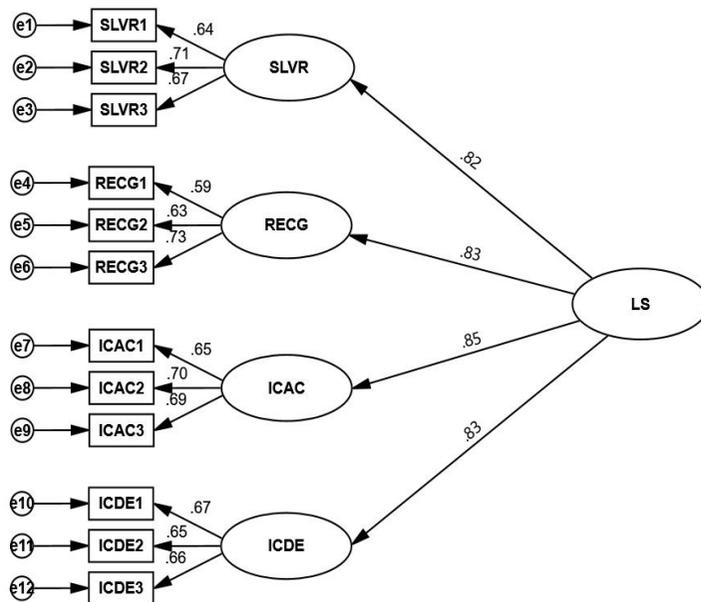
Figure 1 CFA results of LS

3.2 Second Order Confirmatory Factor of Training Design (TD)

The second-order model demonstrated good fit indices: factor loadings were 0.85 for Demand-oriented and Goal-oriented (DOGO), 0.83 for Frontier Content and Evidence-based Practice (FCEBP), 0.85 for Active and Deep Involvement (ADI), and 0.85 for Process Continuity and Coherence System (PCCS). The model fit statistics were as follows: $\chi^2(48) = 63.281$, $p = 0.075$; CMIN/DF = 1.318; CFI = 0.995; TLI = 0.994; IFI = 0.995; RMSEA = 0.025; SRMR = 0.021. All indices exceeded the recommended thresholds, indicating a strong model fit. These results provide robust support for the four-factor theoretical model of training design, confirming its structural validity. See Figure 2 for the model diagram.
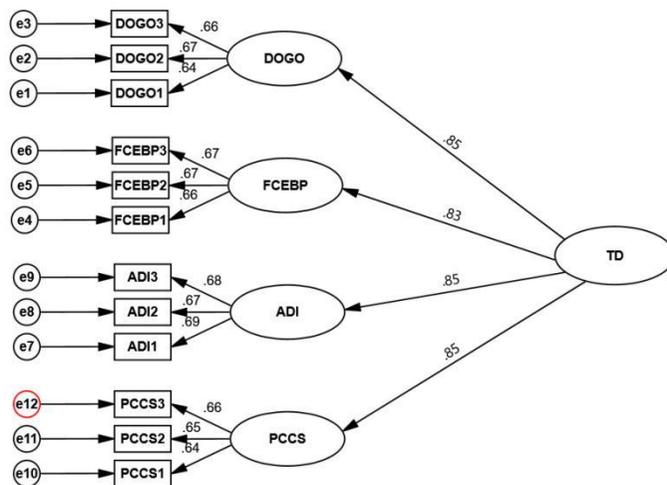
Figure 2 CFA results of TD

3.3 Second Order Confirmatory Factor of Institutional Policy (IP)

The second-order model demonstrated good fit indices: factor loadings were 0.82 for Evaluation and Promotion Orientation (EPO), 0.84 for Incentive Support Mechanism (ISM), and 0.84 for Workload and Time Guarantee (WTG). The model fit statistics were as follows:$\chi^2(24) = 30.152$, p = 0.181; CMIN/DF = 1.256; CFI = 0.998; TLI = 0.997; IFI = 0.998; RMSEA = 0.021; SRMR = 0.017. All indices exceeded the recommended thresholds, indicating a strong model fit. These findings provide robust support for the three-factor theoretical model of institutional policy, demonstrating its structural validity.See Figure 3 for the model diagram.
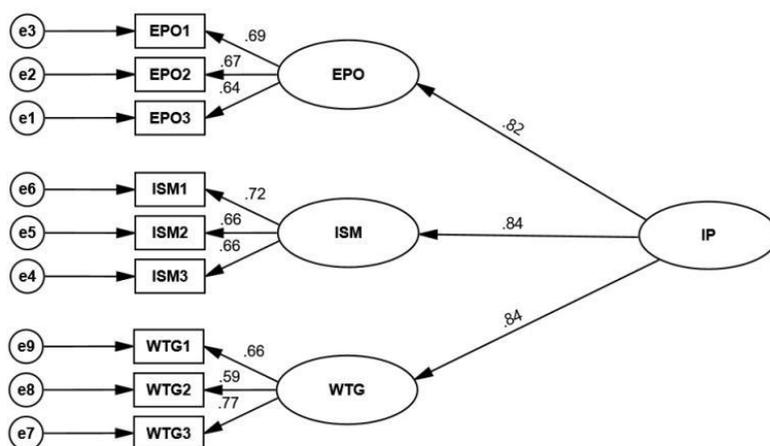
Figure 3 CFA results of IP

3.4 Second Order Confirmatory Factor of Assessment & Feedback (AF)

The second-order model demonstrated good fit indices: factor loadings were 0.84 for D Developmental and formative orientation (DFO), 0.85 for Constructive and action-oriented qualities (CAOQ), 0.86 for Supportive and trusting atmosphere (STA), and 0.83 for Linking with institutional recognition(LIR). The model fit statistics were as follows: $\chi^2(48)$ = 65.112, p = 0.052; CMIN/DF = 1.356; CFI = 0.996; TLI = 0.995; IFI = 0.996; RMSEA = 0.026; SRMR = 0.019. All indices exceeded the recommended thresholds, indicating a strong model fit. These findings provide robust support for the four-factor theoretical model of evaluation and feedback, confirming its structural validity. See Figure 1 for the model diagram. See Figure 4 for the model diagram.
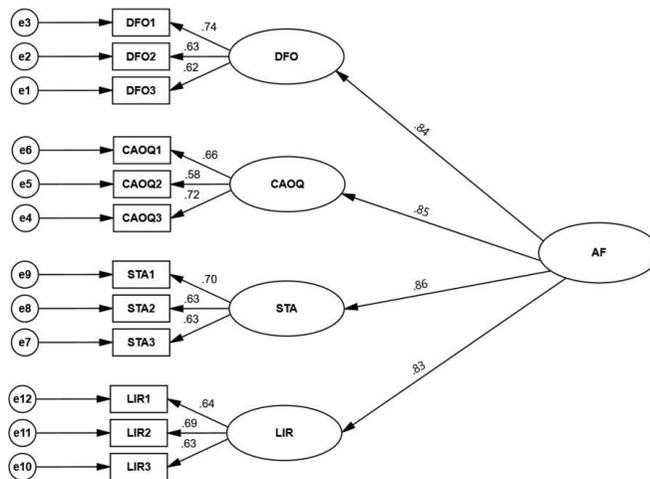
Figure 4 CFA results of AF

3.5 Second Order Confirmatory Factor of Collaboration & Peer Learning (CPL)

The second-order model demonstrated good fit indices: factor loadings were 0.84 for Collaborative organization support (CQS), 0.82 for Peer Support Atmosphere (PSA), and 0.85 for Practice-oriented reflection (POR), 0.84 for Knowledge Sharing Effect (KSE). The model fit statistics were as follows: $\chi^2(48) = 60.211$, $p = 0.113$; CMIN/DF = 1.254; CFI = 0.997; TLI = 0.996; IFI = 0.997; RMSEA = 0.021; SRMR = 0.018. All indices exceeded the recommended thresholds, indicating a strong model fit. These findings provide robust support for the four-factor theoretical model of collaboration and peer learning, confirming its structural validity. See Figure 5 for the model diagram.
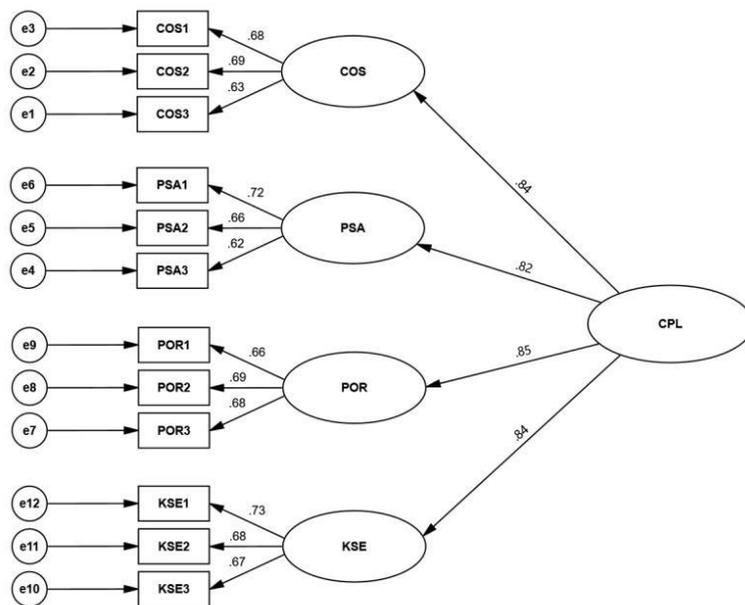
Figure 5 CFA results of CPL

3.6 Second Order Confirmatory Factor of Resource Availability (RA)

The second-order model demonstrated good fit indices: factor loadings were 0.83 for Development funding support (DES), 0.85 for Development time guarantee (DTG), 0.84 for Technology and platform support (TPS), and 0.92 for Professional manpower support (PMS). The model fit statistics were as follows: $\chi^2(48) = 61.305$, p = 0.091; CMIN/DF = 1.277; CFI = 0.997; TLI = 0.996; IFI = 0.997; RMSEA = 0.022; SRMR = 0.020. All indices exceeded the recommended thresholds, indicating a strong model fit. These findings provide strong support for the four-factor theoretical model of resource availability, demonstrating its structural validity.. See Figure 6 for the model diagram.
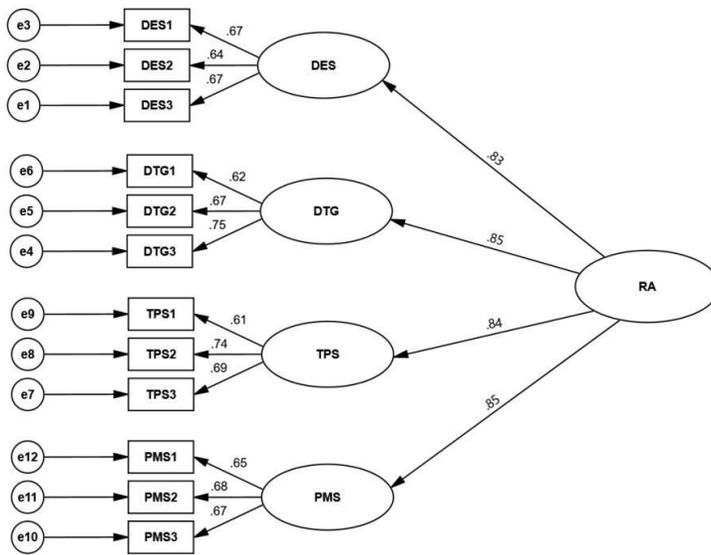
Figure 6 CFA results of RA

3.7 Second Order Confirmatory Factor of Motivation & Engagement (ME)

The second-order model demonstrated good fit indices: factor loadings were 0.84 for Value Utility Perception (VUP), 0.85 for Career Development Driven (CDD), and 0.82 for Active Behavioral Investment (ABI), 0.83 for Intrinsic interest and passion(IIP). The model fit statistics were as follows: $\chi^2(48) = 62.418$, p = 0.085; CMIN/DF = 1.300; CFI = 0.997; TLI = 0.996; IFI = 0.997; RMSEA = 0.023; SRMR = 0.019. All indices exceeded the recommended thresholds, indicating a strong model fit. These findings provide robust support for the four-factor theoretical model of motivation and participation, confirming its structural validity.. See Figure 7 for the model diagram.
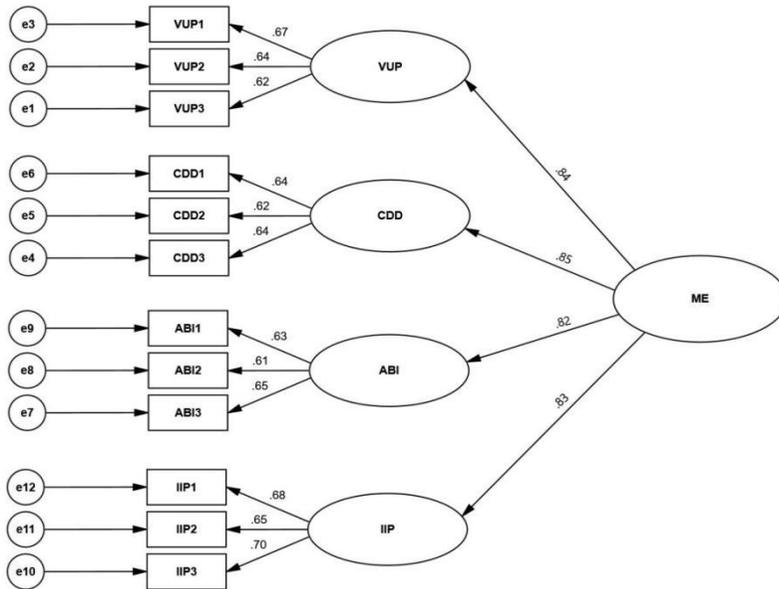
Figure 7 CFA results of ME

3.8 Second Order Verification Factor of Technology Integration (TI)

The second-order model demonstrated good fit indices: factor loadings were 0.94 for Digital Teaching Competencies (DTS), 0.93 for Online Blended Teaching Capabilities (OBTC), 0.95 for Technology-Supported Learning Analysis and Feedback (TSLAF). The model fit statistics were as follows: $\chi^2(93) = 124.286$, $p > 0.05$; CMIN/DF = 1.336; GFI = 0.970; AGFI = 0.958; TLI = 0.992; CFI = 0.993; RMR = 0.028; RMSEA = 0.025. All indices met the recommended thresholds, indicating a strong model fit. See Figure 8 for the model diagram.
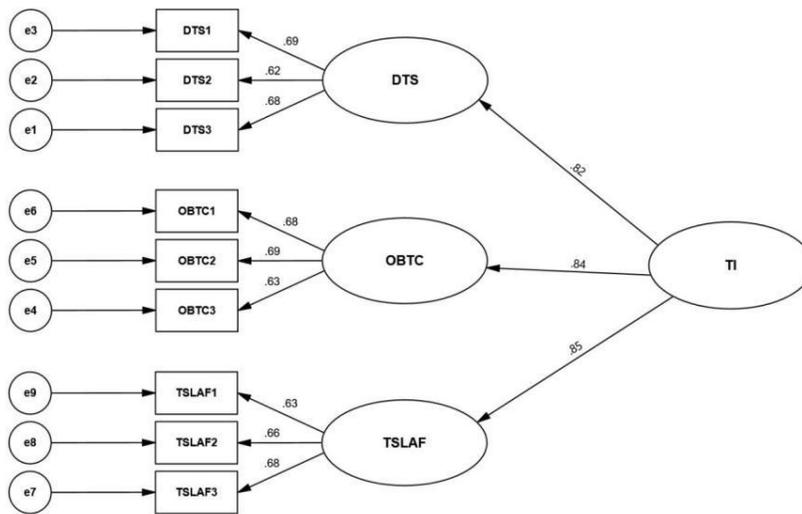
Figure 8 CFA results of TI

3.9 Second-Order Confirmatory Factor Analysis of the Overall Effective Teacher Professional Development Model

In the final second-order factor fitting analysis of the overall Effective Teacher Professional Development Model for Universities in Anhui Province, the factor loading values of each first-order latent variable under the second-order factor ， Effective Professional Development Model, (PD) were as follows: the factor load value of LS was 0.865, the factor load value of TD was 0.891, the factor load value of IP was 0.913, the factor load value of Assessment & Feedback (AF) was 0.880, the factor load value of RA was 0.817, the factor load value of CPL was 0.844, the factor load value of ME was 0.902, and the factor load value of TI was 0.831. The fit indices of the second-order overall model were as follows: the CMIN/DF (χ^2/df) value of the model was 4.322, the chi-square value (χ^2) was 1975.33, and the df were 457, with $p < 0.001$. It should be noted that in large-sample studies, the chi-square test is highly sensitive to sample size, and a significant p-value is a common phenomenon, so the judgment of model fit should focus more on other core fit indices. Other fit indices were as follows: CFI

= 0.923; TLI = 0.916; IFI = 0.923; RMSEA = 0.075; SRMR = 0.041. All fit indices met the recommended academic criteria (χ^2/df < 5, CFI/TLI/IFI > 0.90, RMSEA/SRMR < 0.08), indicating that the overall model matches the scale data well and has a high degree of fit. The specific numerical values of factor loadings and model fit indices, as well as the detailed model diagram, are shown below:
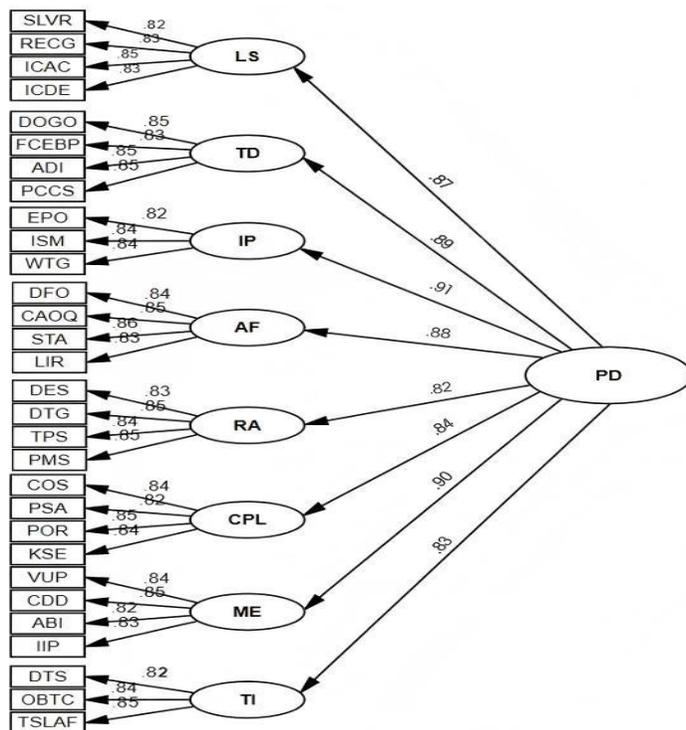

Figure 9

3.10 Empirical analysis based on semi-structured interviews

This study adopted semi-structured interviews to collect data for constructing the effective teacher professional development model for Anhui universities and validating its variables. Based on a predefined eight-dimensional theoretical framework, an interview protocol with nine core questions was

designed. Purposive sampling selected nine participants, including university administrators, faculty development experts and frontline teachers. Systematic data collection via structured questions was maintained with flexible follow-ups to capture emergent insights.

Discussion

The testing results confirmed that Leadership Support (LS), Training Design (TD), Institutional Policy (IP), Assessment & Feedback (AF), Resource Availability (RA), Collaboration & Peer Learning (CPL), Motivation & Engagement (ME), and Technology Integration (TI) all exerted statistically significant positive effects on effective teacher professional development. Non-standardized path coefficients (Estimate) ranged from 0.496 (TI) to 0.913 (IP), with all p-values < 0.05, indicating robust empirical support for the hypothesized relationships.

Analysis results of the basic statistics of variables in this study show that all observed variables have a normal distribution. All fit indices meet the recommended academic criteria, including CFI = 0.923, TLI = 0.916, and RMSEA = 0.075, indicating that the model matches the scale data well and has a high degree of fit.

In summary, for the effective teacher professional development model for universities in Anhui Province, this research used confirmatory factor analysis to verify the correctness of the model, confirming that the model meets the preset threshold requirements and is thus established. Content analysis of 9 interviewees' in-depth interviews showed that the qualitative data is consistent with the model verification results, which is in line with the study's conceptual framework.

Recommendations

1. Recommendations for the application of research results

The effective teacher professional development model for universities in Anhui Province can be applied to optimize the construction of the provincial university faculty development ecosystem. For Anhui provincial education authorities, the model can serve as a core framework for formulating coordinated policies, guiding the establishment of inter-university resource-sharing alliances and improving evaluation benchmarks that emphasize teaching innovation and soft contributions.

For provincial universities, the model provides a roadmap for practical reforms: in top-level design, it supports revising professional title evaluation and workload calculation systems to value teaching contributions; in operational implementation, it guides the transformation of training from one-size-fits-all to personalized services, promotes teacher collaboration communities, and integrates technology into the entire development process. Additionally, a big data-based faculty professional development file can be constructed to form a three-dimensional assessment map, making hidden workloads and development achievements visible and measurable.

2. Recommendations for future research

The current research has not established a differentiated weight system for the eight core dimensions of the model, making it difficult to reflect their relative importance. Future research can integrate qualitative and quantitative methods to develop an empirical weight system and targeted evaluation tools. Existing research has not deeply explored the dynamic interaction mechanisms among the eight dimensions. Advanced statistical methods such as structural equation modeling (SEM) can be used in the future to systematically analyze the

synergistic or inhibitory effects between factors (e.g., how institutional policies regulate the relationship between leadership support and teacher motivation).

To enhance the model's universality, future studies should expand sample coverage to regions with different economic and educational development levels for cross-regional comparisons. Moreover, longitudinal or quasi-experimental designs can be adopted to explore the causal chains between model factors and their ultimate impact on student learning outcomes, constructing a more comprehensive evidence chain linking teacher development to student growth.

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