Development of Primary School Teachers Competency Model
in Dongguan City

Xiaohong Ju

Faculty of Education, Suan Sunandha Rajabhat University, Thailand;

Academic Affairs Office, Dongguan City University, China

Thada Siththada

Department of Educational Administration,

Faculty of Education, Suan Sunandha Rajabhat University, Thailand

Email: 35631152@qq.com

ABSTRACT

In response to the demand for high-quality education development in the new era, constructing a scientific and rational competency model for primary school teachers is a crucial pathway for Dongguan to enhance teacher professionalism, strengthen workforce development, and support the sustained improvement of educational quality. The objectives of this research were to 1) To study the levels of Primary School Teachers Competency in Dongguan City, 2) To study the CFA Primary School Teachers Competency in Dongguan City, and 3) To propose the developing Primary School Teachers Competency model in Dongguan City. The sample consisted of 527 primary school teachers. The research instruments were questionnaires and semi-structured questionnaires of in-depth interviews. Statistics used in data analysis include frequency, percentage, mean, standard deviation, confirmatory factor analysis and the content analysis by educational administration experts. The research results found that the overall level of the competency of teachers was at high levels. The confirmatory factor analysis and the content analysis of in-depth interviews revealed that the teacher competency model for primary school teachers consists of 8 important factors: 1) Sense of Educational Mission，2) Subject Professional Competence，3) Classroom

Teaching Ability， 4) Teaching Evaluation Ability， 5) Communication and Collaboration Ability， 6) Practical Innovation Ability， 7) Personal Physical and Mental Traits， 8) Lifelong Learning Ability.

Keywords: Primary School Teachers, Competency model, Confirmatory factor analysis

1. Introduction

Dongguan faces unique challenges in its rapid urbanization process, including uneven distribution of educational resources and increasing student diversity, which necessitate the establishment of a localized teacher competency framework. This study employs a mixed-methods approach through sequential explanatory design to develop and validate a competency model for primary school teachers in Dongguan (DTCM), combining quantitative analysis with qualitative exploration. Innovatively encompassing eight core dimensions—including Sense of Educational Mission (SEM) and Subject Professional Competence (SPC)—the research identifies emerging urban-specific competencies such as technology ethics education and crisis response. Utilizing multi-source data from stratified random sampling (n=527) and expert interviews (n=9), the model demonstrates excellent psychometric properties (CFI=0.95, RMSEA=0.04), offering a scientifically rigorous yet contextually adaptive assessment tool for teacher professional development.

The theoretical contributions of this study are threefold: (1) it establishing an integrated framework balancing mission-driven ethos and capability development; (2) it enables evidence-based dimension weighting through standardized factor loadings (0.465–0.913); and (3) it introduces context-specific dimensions like "home-school-community collaborate.

2. Research Objectives

The research objectives are 1) to study the levels of Primary School Teachers Competency in Dongguan City; 2) to study the CFA Primary School Teachers Competency in Dongguan City; and 3) to propose the developing Primary School Teachers Competency model in Dongguan City.

3. Scope of the Research

3.1 Scope of the Variables

The research examines one endogenous variable (primary school teachers' competency) and eight exogenous variables: Sense of Educational Mission (SEM), Subject

Professional Competence (SPC), Classroom Teaching Ability (CTA), Teaching Evaluation Ability (TEA), Communication and Collaboration Ability (CCA), Practical Innovation Ability (PIA), Personal Physical and Mental Traits (PPM), and Lifelong Learning Ability (LLA).

3.2 Scope of the Population

The target population includes full-time primary school teachers across urban/rural and public/private schools in Dongguan. A stratified sample of 527 teachers ensures representation of diverse gender, school types, locations, teaching experiences and Highest education.

4. Literature Review

4.1 Theoretical Evolution of Teacher Competency Frameworks

Teacher competency research has evolved significantly since McClelland's (1973) foundational work, integrating psychological, educational, and organizational perspectives. Contemporary frameworks recognize competency as a multidimensional construct encompassing knowledge, skills, attitudes, and personal attributes (McClelland, 1998). Recent studies have identified core dimensions including subject expertise (Zhou, 2020), pedagogical skills (Hu, 2021), and increasingly, digital literacy (Gudmundsdottir & Hatlevik, 2018) and relational competence (Aspelin & Jonsson, 2019).

4.2 The Teacher Competency-Student Achievement Nexus

The teacher-student development nexus has been extensively examined through mediating factors. Empirical evidence demonstrates that teacher competencies influence student outcomes primarily through instructional quality (Fauth et al., 2019; Blömeke et al., 2022), though measurement inconsistencies persist (Lauermann & ten Hagen, 2021). This highlights the need for classroom-embedded assessment approaches.

4.3 Current Trends of Competency Models for Primary School Teachers

In recent years, research on primary school teachers' competency has demonstrated trends toward both diversification and refinement. First, regarding model construction, scholars have predominantly adopted multidimensional frameworks. Representative examples include Zhou's (2020) four-dimensional model and Hu's (2021) refined five-dimensional structure. Second, research perspectives have become increasingly specialized, encompassing both context-specific investigations (e.g., Ma's [2021] project-based teaching competency study) and differentiated examinations of specific teacher subgroups. Third, methodological approaches have shown a distinct shift toward mixed-methods designs, effectively combining qualitative

techniques with quantitative research, as evidenced by Wei et al.'s (2021) identification of 'creative-operational' characteristics in interdisciplinary teaching competency.

5. Research Methodology

5.1 Research Methodology

This study employs a sequential explanatory mixed-methods approach, integrating quantitative surveys (N=527 teachers) with qualitative interviews (9 experts) to assess competency levels, validate factor structures, and develop a localized competency model.

5.2 Research Steps

This study was conducted according to the following steps :the preparatory phase involved a systematic literature review to establish the theoretical foundation of primary school teacher competency models, followed by research design finalization and proposal refinement; the implementation phase encompassed instrument development (Teacher Competency Assessment Tool), comprehensive data collection, and statistical model construction with rigorous validation procedures, ensuring a robust transition from conceptual framework to empirically-validated competency model.

5.3 Data Collection

Quantitative data was collected via stratified random sampling using a 120-item Likert-scale questionnaire, ensuring representation across school types, locations, and experience levels. Qualitative data captured practical challenges through semi-structured interviews.

5.4 Data Analysis

Quantitative analysis included CFA (CFI>0.90, RMSEA<0.08) and reliability/validity tests (CR>0.7, AVE>0.5). Qualitative data underwent thematic analysis (CA>0.8), with methodological triangulation enhancing validity. Ethical protocols were followed throughout.

6. Research Results

6.1 Demographic frequency analysis

This study employed stratified random sampling with a total sample size of 527 participants. Gender distribution: 249 males and 278 females. School location: Urban school teachers account for 50.09% and township teachers account for 49.91%. School type: Public school teachers account for 56.36%, while private school teachers account for 43.64%. Teaching experience: <5 years 211, 16-20 years 161, 5-10 years 86, 11-15 years 41, >20 years

28. Educational attainment: Secondary vocational school 3.03%, associate degree18.83%, bachelor's degree 74.76%, master's or above 3.61%.

6.2 Factor Analysis Suitability Test

This study conducted Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity were performed to examine data adequacy. The KMO value reached 0.940 (exceeding the recommended threshold of 0.90). Bartlett's test yielded χ^2 (7140) = 40861.824 (p < .001).These results confirm the data's exceptional suitability for factor analysis.

6.3 Descriptive Statistics

Descriptive analysis shows that,the overall mean score is between 3.679-3.897. These statistical indicators reflect the distribution of scores for different variables (SEM, SPC, CTA, TEA, CCA, PIA, PPM, LLA) in the survey. In terms of mean scores, from highest to lowest, they are LLA, PIA, CTA, TEA, SPC, PPM, SEM, and CCA. With a standard within 1, the internal differences among respondents are not significant, and within a controllable range, the scores are universal.

Table 1 Indicator descriptive analysis

Name	Minimum value	Maximum value	Mean value	Standard deviation	Kurtosis	Skewness	Interpret
SEM	1.467	4.800	3.783	0.850	-0.517	-1.050	Hight
SPC	1.600	4.733	3.803	0.900	-0.330	-1.174	Hight
CTA	1.600	4.733	3.838	0.869	-0.031	-1.278	Hight
TEA	1.533	4.800	3.831	0.857	0.072	-1.310	Hight
CCA	1.533	4.733	3.679	0.955	-0.914	-0.890	Hight
PIA	1.667	4.867	3.853	0.859	-0.034	-1.265	Hight
PPM	1.667	4.733	3.800	0.887	-0.253	-1.188	Hight
LLA	1.733	4.733	3.897	0.771	0.507	-1.404	Hight

6.4 Correlation Analysis

Correlation analysis among SEM, SPC, CTA, TEA, CCA, PIA, PPM, and LLA showed a significant positive correlation (p<0.01), with coefficients ranging from 0.165 to 0.412. This indicates that each dimension maintained both relative independence and systematic correlation.

6.5 Confirmatory Factor Analysis

6.5.1 Second Order Verification Factor of SEM

The second-order model demonstrated good fit indices: factor loadings were 0.93 for Teacher Professional Ethics (TPE), 0.92 for Educational Sentiment and Beliefs (ESB), and 0.97 for Awareness of Cultivating Core Competencies (ACC). The model fit statistics were as follows: $\chi^2(87) = 115.985$, *p* > 0.05; CMIN/DF = 1.333; GFI = 0.971; AGFI = 0.960; TLI = 0.992; CFI = 0.993; RMR = 0.029; RMSEA = 0.025. All indices met the recommended thresholds, indicating a strong model fit. See Figure 1 for the model diagram.
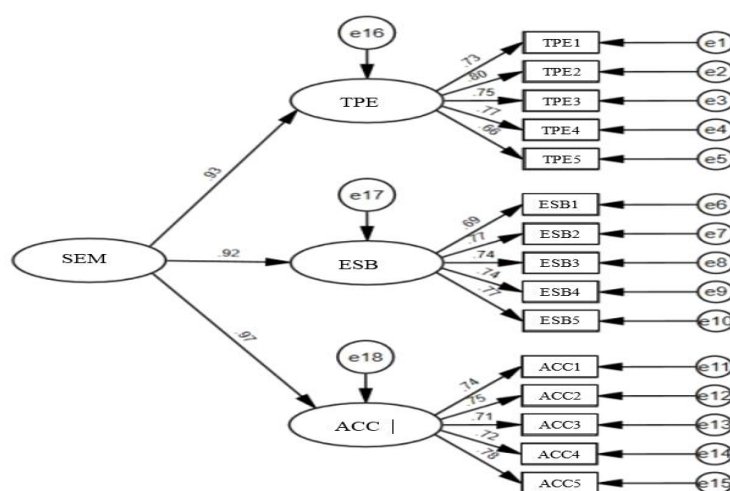
Figure1 Second-order CFA results of Sense of Education Mission (SEM)

6.5.2 Second Order Verification Factor of SPC

The second-order model demonstrated excellent fit indices: factor loadings were 0.98 for Subject Professional Knowledge (SPK), 0.97 for Pedagogical Content Knowledge (PCK), and 0.98 for Knowledge of Pedagogy and Psychology (KPP). The model fit statistics were as follows: $\chi^2(87) = 95.892$, p > 0.05; CMIN/DF = 1.102; GFI = 0.977; AGFI = 0.968; TLI = 0.998; CFI = 0.999; RMR = 0.025; RMSEA = 0.014. All indices exceeded recommended thresholds, indicating outstanding model fit. The model diagram is presented in Figure 2.
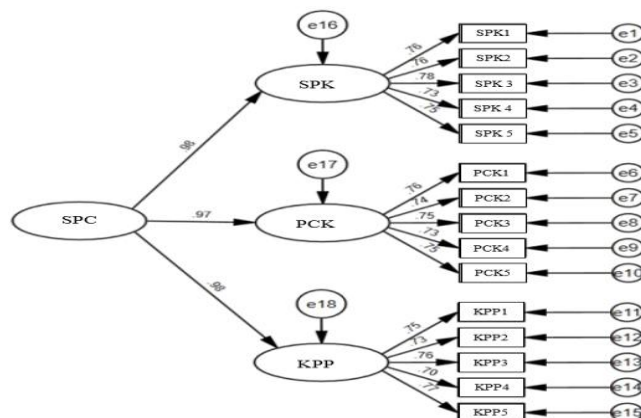

Figure 2 Second-order CFA results of Subject Professional Competence (SPC)

6.5.3 Second Order Verification Factor of CTA

The second-order model demonstrated good fit indices: factor loadings were 0.97 for Instructional Design Skills (IDS), 0.98 for Classroom Management Ability (CMA), and 0.95 for Interdisciplinary Teaching Ability (ITA). The model fit statistics were as follows: $\chi^2(87)$ = 124.193, p > 0.05; CMIN/DF = 1.428; GFI = 0.970; AGFI = 0.959; TLI = 0.990; CFI = 0.992; RMR = 0.028; RMSEA = 0.029. All indices exceeded recommended thresholds, indicating outstanding model fit. The model diagram is presented in Figure 3.
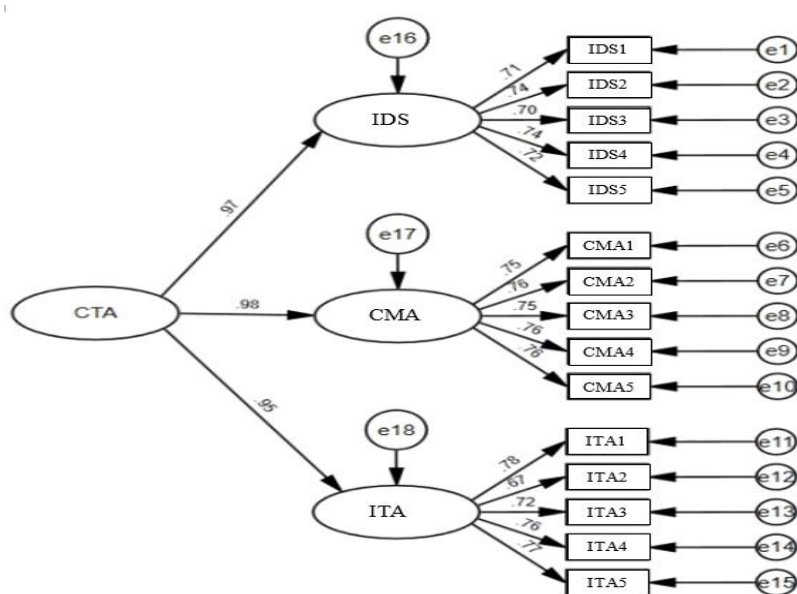

Figure 3 Second-order CFA results of Classroom Teaching Ability (CTA)

6.5.4 Second Order Verification Factor of TEA

The second-order model demonstrated excellent fit indices: factor loadings were 0.98 for Evaluation Tool Design Ability (ETD), 0.98 for Evaluation Feedback and Improvement Ability (EFI), and 0.97 for Awareness of Differentiated Teaching Evaluation (ADT). The model fit statistics were as follows: $\chi^2(87)$ = 99.739, p > 0.05; CMIN/DF = 1.146; GFI = 0.975; AGFI = 0.966; TLI = 0.996; CFI = 0.997; RMR = 0.025; RMSEA = 0.017. All indices exceeded recommended thresholds, indicating outstanding model fit. The model diagram is presented in Figure 4.
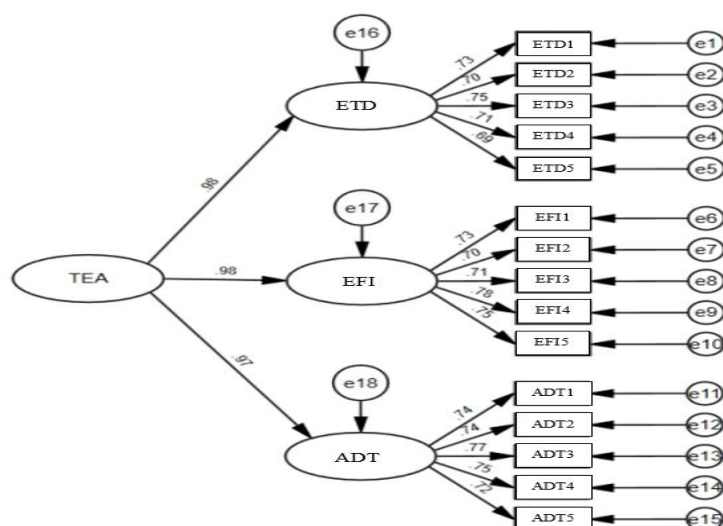
Figure 4 Second-order CFA results of Teaching Evaluation Ability (TEA)

6.5.5 Second Order Verification Factor of CCA

The second-order model demonstrated good fit indices: factor loadings were 0.92 for Teacher-Student Relationship Building (TRB), 0.97 for Home-School Communication Ability (HCA), and 0.91 for Team Collaboration Ability (TCA). The model fit statistics were as follows: $\chi^2(87) = 151.391$, $p > 0.05$; CMIN/DF = 1.740; GFI = 0.963; AGFI = 0.949; TLI = 0.984; CFI = 0.987; RMR = 0.037; RMSEA = 0.038. All indices exceeded recommended thresholds, indicating outstanding model fit. The model diagram is presented in Figure 5.
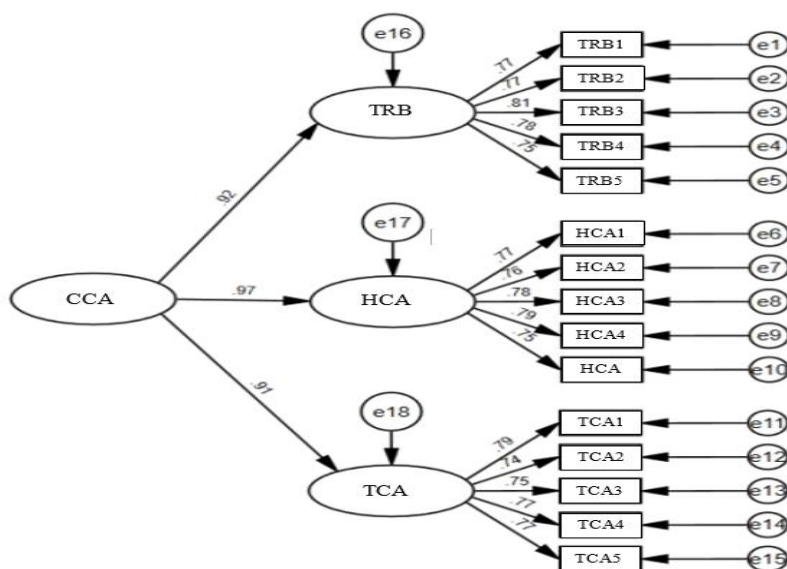

Figure 5 Second-order CFA results of Communication and Collaboration Ability (CCA)

6.5.6 Second Order Verification Factor of PIA

The second-order model demonstrated excellent fit indices: factor loadings were 0.97 for Awareness of Teaching Reform and Innovation (ARI), 0.95 for Teaching Problem-Solving Ability (TPS), and 0.98 for Informatization Teaching Ability (INF). The model fit statistics were as follows: $\chi^2(87) = 122.525$, $p > 0.05$; CMIN/DF = 1.408; GFI = 0.970; AGFI = 0.959; TLI = 0.990; CFI = 0.992; RMR = 0.029; RMSEA = 0.028. All indices exceeded recommended thresholds, indicating outstanding model fit. The model diagram is presented in Figure 6.
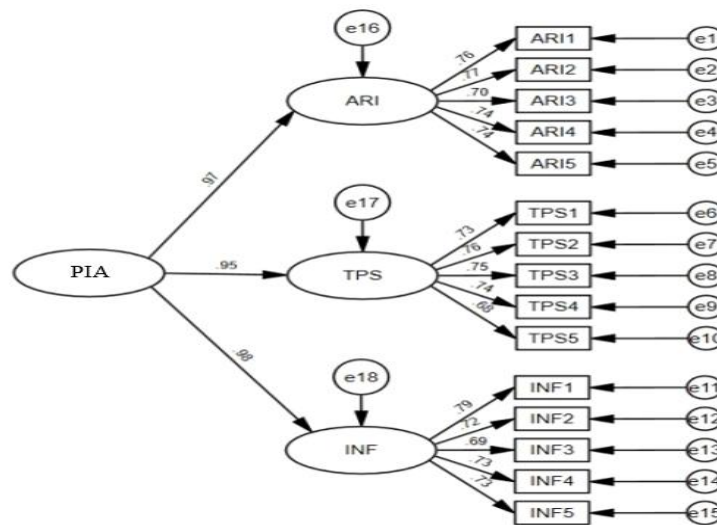

Figure 6 Second-order CFA results of Practical Innovation Ability (PIA)

6.5.7 Second Order Verification Factor of PPM

The second-order model demonstrated excellent fit indices: factor loadings were 0.96 for Emotional Adjustment Ability (EAA), 0.90 for Emotional Support Ability (ESA), and 0.91 for Ability to Resist Adversity (ARA). The model fit statistics were as follows: $\chi^2(87) = 100.905$, $p > 0.05$; CMIN/DF = 1.160; GFI = 0.975; AGFI = 0.965; TLI = 0.996; CFI = 0.997; RMR = 0.029; RMSEA = 0.017. All indices exceeded recommended thresholds, indicating outstanding model fit. The model diagram is presented in Figure 7.
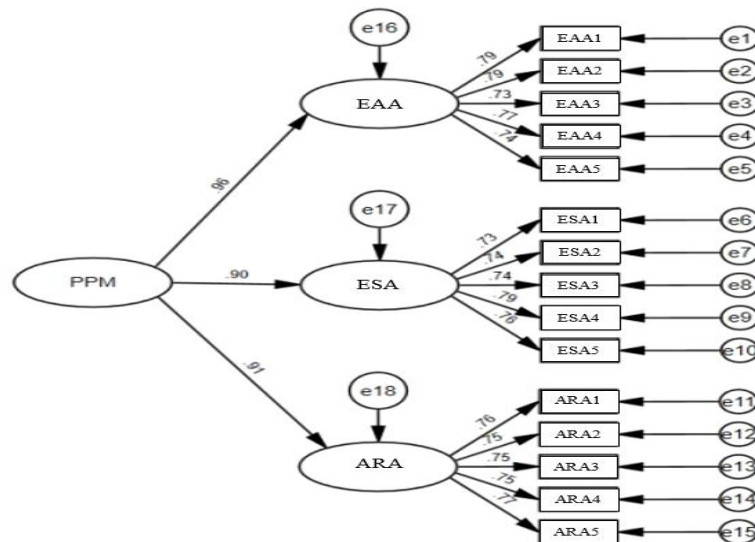
Figure 7 Second-order CFA results of Personal Physical and Mental Traits (PPM)

6.5.8 Second Order Verification Factor of LLA

The second-order model demonstrated good fit indices: factor loadings were 0.92 for Belief in Continuous Learning (BCL), 0.93 for Positive Learning Attitude (PLA), and 0.94 for Improvement Awareness (RIA). The model fit statistics were as follows: χ^2 (87) = 117.557, p > 0.05; CMIN/DF = 1.351; GFI = 0.972; AGFI = 0.962; TLI = 0.990; CFI = 0.992; RMR = 0.027; RMSEA = 0.026. All indices exceeded recommended thresholds, indicating outstanding model fit. The model diagram is presented in Figure 8.
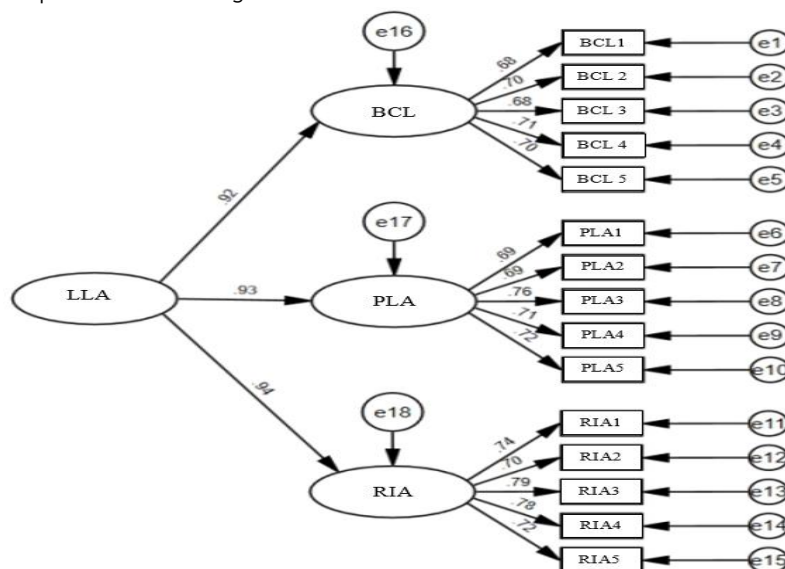

Figure 8 Second-order CFA results of Lifelong Learning Ability (LLA)

6.5.9 Second Order Verification Factor of PPM

In the final second-order factor fitting degree of the model, the factor load value of SEM is 0.704, the factor load value of SPC is 0.487, the factor load value of CTA is 0.519, the factor load value of TEA is 0.658, the factor load value of CCA is 0.522, the factor load value of PIA is 0.501, the factor load value of PPM is 0.545, and the factor load value of LLA is 0.465. The CMIN/DF value of the model is 1.153, the chi square value is 281.323, and the degrees of freedom are 244, $p > 0.05$，   Other adaptation indicators GFI=0.958; AGFI=0.948; TLI=0.996; CFI=0.996; RMR=0.032; RMSEA=0.017; All adaptation indicators meet the requirements, indicating that the model matches the scale well and has a high degree of fit. The specific numerical values and model diagrams are shown below:
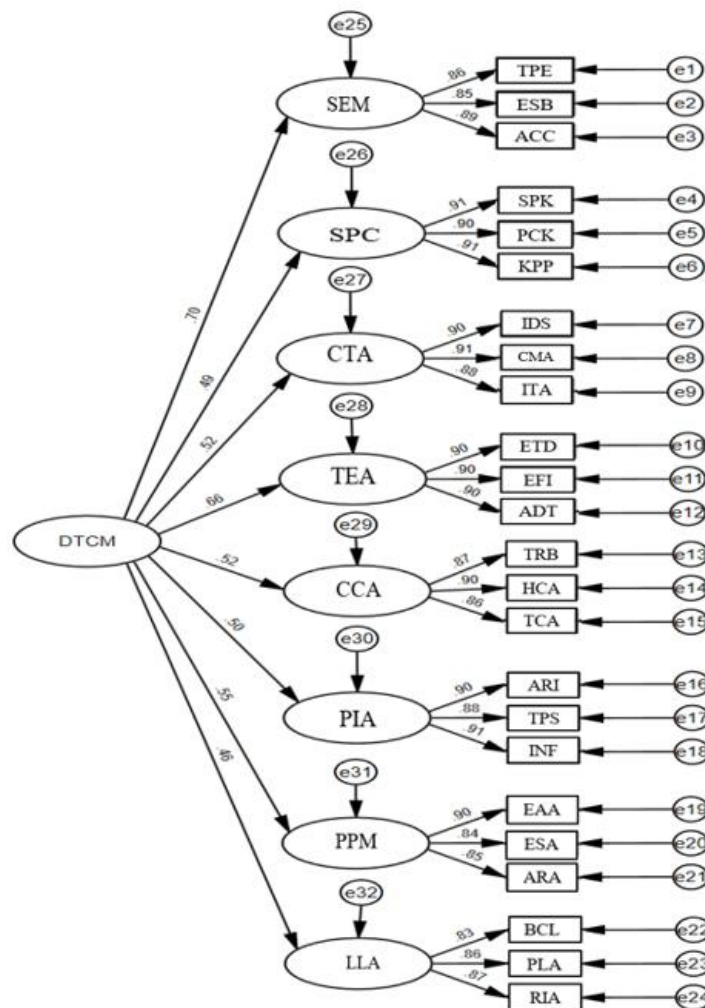

Figure 9 Second-order CFA results of primary school Teachers Competency Model in Dongguan City (DTCM)

6.6 Empirical analysis based on semi-structured interviews

This study employed semi-structured interviews to collect data for constructing a primary school teacher competency model and validating its related variables. Based on a predefined theoretical framework, the researchers designed an interview protocol containing nine core questions covering dimensions such as professional literacy, teaching ability, and occupational traits. Using purposive sampling, nine primary education experts were selected as participants. During implementation, the study maintained systematic data collection through pre-designed structured questions while retaining flexibility for follow-up questions to capture emergent perspectives.

7. Conclusion and Discussion

7.1 Model Validation and Hierarchical Structure

This study developed an eight-dimensional primary school teachers competency model in Dongguan City (DTCM) through confirmatory factor analysis, demonstrating robust psychometric properties (CFI=0.95, RMSEA=0.04) with its three-tier structure (higher-order DTCM ⟶ eight first-order latent variables ⟶ observed indicators). All standardized factor loadings were statistically significant ($p<0.001$), with Sense of Educational Mission (SEM, β=0.704) emerging as the core dimension, while Lifelong Learning Ability (LLA, β=0.465) requires further refinement in measurement tools. The first-order latent variables exhibited excellent loadings (0.833-0.913) on their respective indicators, particularly Subject Professional Competence (SPK=0.912) and Practical Innovation Ability (INF=0.909). This structural validation confirms the theoretical framework while highlighting the dual emphasis on mission-driven ethos and competency development, providing a scientific foundation for teacher assessment.

7.2 Key Patterns in Competency Development

Analysis of 527 teachers revealed: (1) All dimensions scored moderately high (3.679-3.897/5-point scale), with Lifelong Learning Ability (3.897) and Classroom Teaching Ability (3.838) as strengths, while Communication and Collaboration Ability (3.679) required prioritized improvement; (2) Significant negative skewness (-0.89 to -1.40) may reflect self-report bias or genuine competency clustering; (3) The high variability in Collaboration Ability (SD=0.955) contrasted with the stability of Lifelong Learning performance (SD=0.771), suggesting the need for tiered training programs tailored to individual differences. These findings offer empirical support for differentiated teacher development strategies.

7.3 Interconnected Competency Network

Correlation analysis identified SEM as the central node, showing strong associations with all dimensions (r=0.247-0.412), particularly Teaching Evaluation Ability (TEA, r=0.412). Two distinct clusters emerged: the Teaching Efficacy Cluster (TEA-SPC-CTA) and the Developmental Adaptability Cluster (CCA-LLA-PPM). The weak linkage between Practical Innovation Ability (PIA) and Subject Professional Competence (SPC) (r=0.210), along with the limited integration of communication skills with core teaching competencies (r=0.214-0.259), indicates the necessity of curriculum restructuring to bridge competency gaps. This networked characteristic provides a novel perspective for systemic teacher training.

7.4 Empirical testing and expansion of the model

This study empirically tested and expanded the competency model of primary school teachers through semi-structured interviews. Research has found that all eight core variables of existing models have been validated in practice, and the observation points of each variable demonstrate strong applicability in different disciplines and teaching contexts. During the interview, experts proposed multiple exploratory observation points, including technology ethics education, local resource development, emotional perception ability, etc.

7.5 Practical Implications and Future Directions

Three evidence-based recommendations are proposed: (1) Develop targeted training for Communication and Collaboration Ability, emphasizing scenario-based simulations for home-school collaboration; (2) Establish mechanisms to integrate innovative practices with subject teaching, such as interdisciplinary teaching-research workshops; (3) Refine multidimensional measurement tools for Lifelong Learning Ability, incorporating indicators of informal learning behaviors. The centrality of SEM underscores the importance of mission-driven teacher development in rapidly urbanizing contexts. Future research should employ longitudinal designs to examine the impact of interventions on competency trajectories and explore the model's applicability in emerging contexts such as smart education.

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