



Development Model for Improving Teacher Professional under the Background of Digital Transformation at Guizhou Qiannan Economic College

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Abstract

The objectives of this research were to: 1) examine the current status of teacher professional development quality at Guizhou Qiannan Economic College; 2) develop a model for enhancing teacher professionalism amidst digital transformation; and 3) evaluate the suitability and feasibility of the developed model. A mixed-methods research design was employed, involving a sample of 258 teachers selected through simple random sampling and 12 key informants for semi-structured interviews. Research instruments included a 5-point Likert scale questionnaire (Reliability = 0.94) and an interview guide. Data were analyzed using Mean, Standard Deviation, and content analysis.

The findings revealed that: (1) the overall status of teacher professional development quality was at a high level, with Institutional Support receiving the highest rating, while Attitudes and Challenges were at a moderate level due to concerns regarding workload and rapid technological shifts. (2) The developed "Circular Ecosystem Model" integrates five interrelated dimensions: Digital Skills, Pedagogical Innovation, Professional Development, Institutional Support, and Psychological Adaptation. (3) Expert evaluation confirmed that the model possesses a very high level of suitability and feasibility. The study concludes that sustainable digital transformation in higher education requires a holistic approach that balances technical training with institutional incentives and workload management to ensure long-term teacher well-being and professional growth.

Keywords: Teacher Professionalism, Digital Transformation, Guizhou Qiannan Economic College

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Introduction

In recent years, digital transformation has dramatically reshaped the landscape of higher education worldwide, placing increased demands on teachers to develop their technological and pedagogical competencies (Redecker & Punie, 2022; Wang & Chu, 2023). For university instructors, “digital competence” the ability to effectively use information and communication technologies (ICT) in teaching, resource creation, and institutional tasks has become one of the core skills required for navigating the digital era (Redecker & Punie, 2022). Moreover, empirical studies in China suggest that higher-education teachers increasingly perceive their digital competence to be critical, with self-efficacy and institutional facilitating conditions significantly predicting their readiness and competence to adopt ICT-based teaching methods (Wang & Chu, 2023). These trends underscore that teacher professional development in the 21st century must incorporate digital skills, pedagogical innovation, and institutional support systems to ensure effective, sustainable teaching in a rapidly evolving educational environment.

Within this broader context, the situation in Chinese higher-education institutions remains uneven. A recent comprehensive systematic review of in-service university educators in China documented widespread variation in ICT/digital competence, largely influenced by factors such as institutional policies, infrastructure availability, access to training, and demographic variables (e.g., discipline, institutional type) (Heliyon Author(s), 2024). Concurrently, research focusing on primary and secondary education in China has emphasized the persistence of a “digital divide” between urban and rural areas, illustrated by disparities in Technological Pedagogical Content Knowledge (TPACK), access to resources, and attitudes towards technology integration (Liang et al., 2024). These findings point to structural and contextual challenges including resource limitations, regional inequality, and inconsistent professional development opportunities that may hinder the widespread adoption of digital pedagogy across different types of institutions.

Given these contextual challenges and emerging demands, institutions such as Guizhou Qiannan Economic College located in Qiannan Prefecture, a region characterized by socioeconomic diversity and varied levels of digital infrastructure face a compelling need to adopt a strategic, context-sensitive model for teacher professional development. Such a model should integrate digital competence, pedagogical innovation, institutional support, and ongoing professional growth mechanisms in a sustainable manner. This research therefore aims to develop and validate a comprehensive “development model for improving teacher professionalism under the background of digital transformation” tailored to the institutional context and needs of Guizhou Qiannan Economic College.

Research Objectives

1. To examine the current status of teacher professional development quality at Guizhou Qiannan Economic College.
2. To develop a model for enhancing teacher professional development amidst digital transformation at Guizhou Qiannan Economic College.
3. To evaluate the suitability and feasibility of the developed model.

Literature Review

Guizhou Province, located in southwestern China, is characterized by complex geography and uneven levels of digital and educational development. Compared with more economically advanced regions, higher education institutions in Guizhou continue to experience constraints in digital infrastructure, access to learning technologies, and students’

digital competencies. As a result, students often rely on accessible mobile-based platforms and social media for learning. This regional context underscores the need for a localized, context-sensitive model that can effectively address the digital divide while supporting students' academic performance..

Digital competence has become a fundamental requirement for educators in higher education, particularly under the pressures of digital transformation and hybrid/blended learning (Lan, Bailey & Tan, 2024). In a systematic review of studies conducted globally, including university settings, it was found that “digital competence” for educators encompasses not only technical ICT skills, but also pedagogical, informational, and attitudinal competencies necessary to design and implement technology-enhanced learning environments (Zhang, Hasan Sazalli, Miskam & Nadjwa, 2024).

Focusing on the Chinese context, recent reviews and empirical studies highlight persistent disparities in digital readiness among teachers. According to Li Yang, García-Holgado, & Martínez-Abad (2023), research on K–12 and in-service teachers in China shows wide variation in use of terms such as “ICT competency,” “information literacy,” and “digital competence,” reflecting differing conceptualizations of digital capacity. Their review of 50 studies from 2010–2023 demonstrates that while many teachers show basic awareness of ICT use, far fewer are proficient in integrating technology pedagogically or delivering digitally mediated instruction.

Further, empirical data from higher-education instructors confirm these challenges. For example, Feng & Sumettikoon (2024) conducted a survey among EFL teachers in Chinese universities and reported uneven levels of digital literacy across five assessed dimensions; the results underscored the need for structured, context-sensitive professional development to improve digital teaching capacity.

Given these patterns, some scholars argue that improving teacher digital competence in higher education requires more than isolated trainings or courses. Instead, they call for context-sensitive, institutional-level models that integrate digital competence frameworks, infrastructural support, continuous professional development, and pedagogical innovation (Lan, Bailey & Tan, 2024; Zhang et al., 2024). However, existing research rarely offers comprehensive development models tailored specifically to vocational or regional colleges such as those operating in less-urbanized areas in China. This gap justifies the present study's aim to develop and validate a holistic development model for enhancing teacher professionalism under digital transformation at Guizhou Qiannan Economic College.

Conceptual Framework

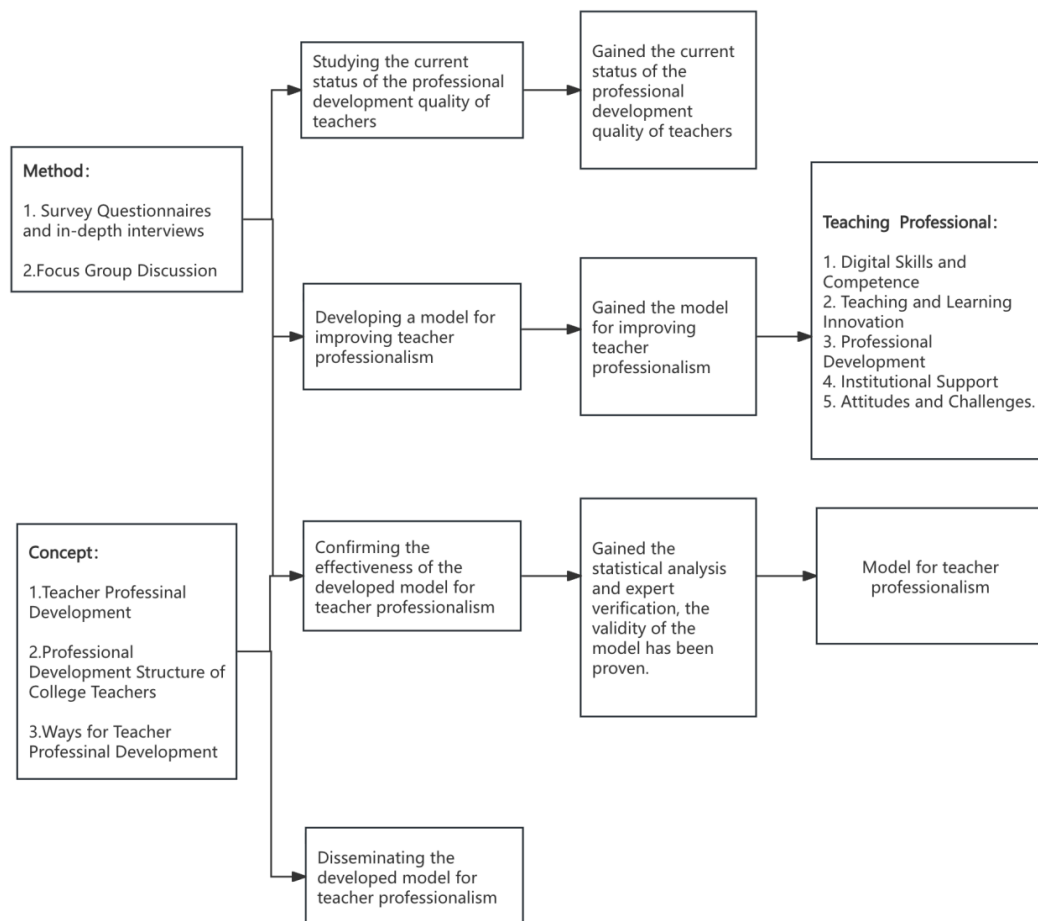


Figure 1: Conceptual Framework

Research Methodology

Research Design

This study adopts a mixed-methods design, integrating quantitative and qualitative approaches to explore and validate a development model for improving teacher professionalism under digital transformation at Guizhou Qiannan Economic College. The mixed-methods approach enables the study to capture measurable relationships among variables while also obtaining rich contextual insights from teachers' experiences (Creswell & Creswell, 2018; Hesse-Biber, 2020). This aligns with the study's three objectives: (1) assess the current status of teacher professionalism, (2) develop a model for improvement, and (3) validate the model in a real institutional context.

Quantitative Research Design

The quantitative component employed a structured questionnaire, which measures five independent dimensions influencing teacher professionalism:

1. Digital Skills and Competence : teachers' ability to integrate and adapt digital tools, grounded in TPACK and digital literacy frameworks (Koehler & Mishra, 2020).

2. Teaching and Learning Innovation : adoption of blended and learner-centered strategies (Salinas & Sánchez, 2021).

3. Professional Development :engagement in continuous learning, networking, and research (Guskey, 2002; Desimone, 2009).

4. Institutional Support :organizational resources, culture, and policies (Bali & Liu, 2023).

5. Attitudes and Challenges :teachers' motivation, perceptions, and barriers (Nguyen et al., 2022).

The dependent variable is Teacher Professionalism, conceptualized as teaching efficacy, research engagement, and development of student digital skills (Darling-Hammond et al., 2022; Tondeur et al., 2021).

Qualitative Research Design

A phenomenological approach was used to capture teachers' lived experiences with professional development and digital transformation. Twelve purposively sampled participants (faculty involved in digital projects or professional development) were interviewed for 45–60 minutes using semi-structured protocols. Data were transcribed, translated, and analyzed via NVivo with deductive and inductive coding, ensuring credibility through member checking and independent coder agreement (Braun & Clarke, 2021; Yin, 2022).

Research Instruments

Questionnaire

The questionnaire consisted of two parts:

Part I: Demographic information (gender, age, academic rank, experience, prior digital teaching exposure).

Part II: 50 items measuring the five core dimensions of teacher development, using a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree) (Taherdoost, 2016).

The instrument was validated by experts and pilot-tested, with reliability confirmed through Cronbach's alpha, where $\alpha > 0.8$ indicates good internal consistency (George & Mallery, 2019).

Interviews

Semi-structured interviews aligned with the three research objectives:

1. Assess current professional development status.
2. Identify factors influencing teacher growth.
3. Validate the proposed development model.

Interviews were conducted face-to-face or via video conference, audio-recorded, transcribed, and analyzed using thematic content analysis.

Expert Evaluation

The evaluation by Stufflebeam, guided expert validation on five dimensions: Utility, Feasibility, Propriety, Accuracy, Sustainability, and Expert Suggestions. Five experts assessed the model using a structured questionnaire (5-point Likert) and qualitative feedback.

Quality of Research Instruments

Reliability Analysis: Cronbach's alpha was used to assess internal consistency. Following George & Mallery (2019) and Taherdoost (2016):

All instruments demonstrated acceptable to excellent reliability. The Overall Scale Reliability = 0.89

Population and Sample

Population

The target population comprises faculty members engaged in digital pedagogy transformation at Guizhou Qiannan Economic College. As of May 2025, the college has six

secondary colleges Finance, Accounting, Management, Information, Grammar, and Marxism and 30 undergraduate majors, with over 14,000 full-time students and 728 full-time teachers. Full-time teachers were selected as the study population to represent the larger faculty body (Lan et al., 2024).

Sample

Quantitative Sample

The sample size was calculated using Taro Yamane's formula for a population of 728, with a 5% margin of error, resulting in 258 participants (Yamane, 1967). A multi-stage sampling strategy ensured representation across disciplines and experience levels.

Key informants

Purposive sampling selected 12 teachers for semi-structured interviews. Participants represented diverse disciplines (science, humanities, business, arts), teaching experience, and digital literacy levels to capture a comprehensive understanding of teachers' perceptions and challenges (Creswell & Creswell, 2018).

Expert Evaluation Sample

Five educational experts with backgrounds in educational technology, teacher development, and digital transformation were invited to review and validate the proposed model (Stufflebeam, 2003).

Data Collection

Quantitative Data Collection

A structured digital competency questionnaire assessed faculty familiarity with digital tools, integration of technology in teaching, and perceptions of digital pedagogy (Li et al., 2023).

Data Analysis: Statistical methods, including descriptive and inferential analyses, examined trends and correlations.

Qualitative Data Collection

Semi-structured interviews explored in-depth experiences and challenges.

Participant Selection: 12 participants categorized as Digital Transformation Leaders (3), Mid-Level Adopters (6), and Reluctant Adopters (3) (Nguyen et al., 2022).

Interview Procedure: Conducted via video conferencing; each session lasted 45–60 minutes.

Data Capture: Audio-recorded, transcribed, and translated into English.

Expert Evaluation

Experts reviewed the model using a structured questionnaire based on the framework of Stufflebeam, 2003) to assess utility, feasibility, propriety, accuracy, sustainability, and provide qualitative suggestions.

Data and Statistical Analysis

Quantitative Data Analysis

Descriptive Statistics: Mean, standard deviation, and level distributions summarized teacher experiences and professional development perceptions.

Professional identity scoring: 4.24–5.00 = Highest, 3.43–4.23 = High, 2.62–3.42 = Moderate, 1.81–2.61 = Low, 1.00–1.80 = Lowest.

Qualitative Data Analysis

The qualitative data were analyzed using a systematic content-analysis approach based on contemporary methodological guidelines. The analysis followed the structured procedures described by Çetinkaya (2025) which include data reduction, coding, categorization, theme development, and iterative verification to ensure analytical rigor. Interview transcripts were repeatedly reviewed to identify consistent patterns related to

institutional support, professional development, digital competence, and teaching innovation. The emerging themes were compared and triangulated with quantitative findings, contributing to the validation and refinement of the Circular Ecosystem Model for Improving Teacher Professionalism under Digital Transformation

Expert Evaluation Data Analysis

Quantitative analysis summarized Likert-scale responses using mean and standard deviation, interpreted on a five-level scale (4.21–5.00 = Very High; 3.41–4.20 = High; 2.61–3.40 = Moderate; 1.81–2.60 = Low; 1.00–1.80 = Very Low). Qualitative feedback was thematically analyzed to refine the model. Integration of quantitative and qualitative data confirmed the model’s theoretical soundness, practical feasibility, and long-term applicability (Braun & Clarke, 2021; Bali & Liu, 2023).

Results

Results of the Current Status of Teachers’ Professional Development at Guizhou Qiannan Economic College

Overall the teaching staff of Guizhou Qiannan Economic College is predominantly well-educated, moderately experienced, and digitally engaged. The majority hold master’s degrees, have 5–20 years of teaching experience, and show positive participation in professional development programs.

The table below displays the mean, standard deviation (S.D.), qualitative level. The overall row summarizes the aggregated results across all five dimensions.

Table 1 Descriptive Statistics of Teachers’ Professional Development Quality

Teachers’ Professional Development Quality	Mean	S.D.	Level	Rank
Digital Skills and Competence	3.76	1.12	High	2
Teaching and Learning Innovation	3.72	1.16	High	3
Professional Development	3.72	1.14	High	4
Institutional Support	3.81	1.10	High	1
Attitudes and Challenges	3.00	1.35	Moderate	5
Overall	3.60	1.17	High	

As shown in Table 1 the overall mean score of teachers’ professional development quality at Guizhou Qiannan Economic College is 3.60, which falls within the “High” level. This finding indicates that teachers, in general, demonstrate a positive perception of their professional competence and institutional environment during the ongoing process of digital transformation.

The Results of Developing a Model for Improving Teacher Professionalism

This section outlines the interrelationships among the five key dimensions of teacher professionalism amidst digital transformation at Guizhou Qiannan Economic College. Based on Pearson’s correlation and multiple regression analyses, the findings confirm that

Institutional Support (IS) and Teaching and Learning Innovation (TLI) serve as the primary drivers of the model. Digital Skills and Competence (DSC) act as the foundational layer that triggers innovation, while Professional Development (PD) functions as a critical bridge connecting individual skills to institutional structures. Finally, Attitudes and Challenges (AC) represent the psychological and adaptive outcomes of the teachers within this digital ecosystem.

Qualitative Analysis: Thematic Findings from Teacher Interviews

To triangulate the quantitative data, semi-structured interviews were conducted with 12 teachers. The qualitative insights are categorized into five thematic dimensions as summarized in Table X below:

Theme	Key findings	Representative Quotes
1. Significance of Professionalism	Teachers view digital competence as an ethical responsibility and a core part of modern pedagogy.	<i>"Professionalism today means more than teaching well; it's about using technology responsibly and creatively."</i> (T2)
2. Problems & Challenges	High workload, rapid tech changes, and uneven digital literacy among faculty (especially senior staff).	<i>"Many teachers know how to use digital platforms but rarely apply them creatively in class."</i> (T6)
3. Support Needs	Urgent demand for practical, hands-on training over theoretical sessions; need for clear institutional rewards.	<i>"We need more practical sessions that show us how to apply technology directly in teaching."</i> (T1)
4. Enabling Factors	Peer collaboration, mentorship, and clear institutional goals enhance motivation.	<i>"When the school sets clear goals and rewards for digital innovation, we are more motivated to try new things."</i> (T7)
5. Sustainability	Long-term success requires ongoing evaluation and psychological support to prevent burnout.	<i>"Digital literacy is essential to connect with our students; without it, we cannot maintain standards."</i> (T3)

Perceptions and Challenges of Digital Integration

The qualitative data suggests that while teachers are motivated, they face a "Digital Adaptation Gap." Older faculty members experience higher stress levels compared to younger counterparts. Furthermore, the conflict between Institutional Encouragement and

Administrative Workload creates a bottleneck. Although policies promote innovation, the "lack of time" and "insufficient technical guidance" hinder actual implementation.

Strategic Approaches for Professional Growth

The interviewees emphasized that a sustainable model must shift from General Training to Context-Sensitive Support. Peer collaboration emerged as a low-cost, high-impact strategy for sharing digital pedagogy. Teachers highlighted that for a model to be effective, it must integrate:

1. Ethical Responsibility: Responsible use of AI and digital tools.
2. Pedagogical Expertise: Beyond basic IT skills into "Digital Pedagogy."
3. Incentive Structures: Recognition of digital innovation in career progression.

The qualitative insights strongly align with the quantitative model. The "High" mean scores in Institutional Support and Digital Skills found in the survey are mirrored by the teachers' recognition of their importance in the interviews. Conversely, the "Moderate" scores in Attitudes and Challenges are explained qualitatively by the pressures of workload and the speed of technological change. This synthesis confirms that an **integrated, circular model**—incorporating skills, innovation, support, and psychological well-being—is essential for Guizhou Qiannan Economic College.

Results of Expert Evaluation of the Developed Model

To verify the effectiveness of the Circular Ecosystem Model for improving teacher professionalism under digital transformation, five experts with backgrounds in teacher education, digital pedagogy, institutional management, and policy evaluation assessed the model. They used an Expert Evaluation Questionnaire based on Stufflebeam's concept, covering five dimensions: Utility, Feasibility, Propriety, Accuracy, and Sustainability, rated on a 5-point Likert scale, with space for qualitative comments.

Descriptive statistics and content analysis were applied to the questionnaire responses to evaluate the model's overall validity, practicality, and readiness for implementation. The evaluation aimed to ensure that the model met both theoretical rigor and practical applicability for Guizhou Qiannan Economic College and similar higher education institutions.

After developing the Circular Ecosystem Model for Improving Teacher Professionalism under Digital Transformation, five experts evaluated its validity, feasibility, and sustainability using an Expert Evaluation Questionnaire based on Stufflebeam's concept. The questionnaire covered five dimensions: Utility, Feasibility, Propriety, Accuracy, and Sustainability. Quantitative ratings and qualitative feedback were analyzed to refine and finalize the model.

Quantitative Evaluation Results

The summarizes of the experts' ratings. All dimensions received very high scores, indicating strong agreement on the model's theoretical soundness, practical applicability, and potential for long-term impact.

The Evaluation Results was shown in Tabe 2

Table 2. Results of Expert Evaluation on the Developed Model (n = 5)

Dimension	Mean ($\bar{X}$)	S.D.	Interpretation	Rank
1. Utility	4.68	0.32	Very High	2
2. Feasibility	4.55	0.37	Very High	3

Dimension	Mean ($\bar{X}$)	S.D.	Interpretation	Rank
3. Propriety	4.72	0.28	Very High	1
4. Accuracy	4.49	0.41	Very High	4
5. Sustainability	4.46	0.43	Very High	5
Overall	4.58	0.36	Very High	

From Table 2 . All dimensions were rated at a very high level ($\bar{X} = 4.46\text{--}4.72$), with Propriety receiving the highest score, reflecting ethical and policy alignment. Overall, the model was considered valid, functional, and contextually appropriate.

Qualitative Feedback from Experts

Experts suggested improvements in three areas:

1. Conceptual Enhancement: Transform the model from a linear to a circular framework to reflect continuous, reciprocal professional growth.
2. Clarification of Interrelationships: Emphasize the reciprocal influence among the five dimensions, with Digital Skills and Teaching Innovation as core drivers, Professional Development and Institutional Support as enablers, and Attitudes and Challenges as an overarching moderating environment.
3. Strengthening Implementation and Sustainability: Include policy support, ongoing training, mentoring, and periodic evaluation to ensure practical feasibility and long-term sustainability.

The Final Model

The Model for Improving Teacher Professionalism is now a comprehensive, interactive, and sustainable framework. It conceptualizes teacher professionalism as a dynamic construct influenced by five interrelated dimensions:

- 1) Digital Skills and Competence – foundational technical and cognitive skills.
- 2) Teaching and Learning Innovation – translating skills into pedagogical creativity.
- 3) Professional Development – continuous learning, reflection, and collaboration.
- 4) Institutional Support – policy, leadership, and resource provision.
- 5) Attitudes and Challenges – emotional and cognitive factors moderating engagement and adaptability.

The model illustrates a balanced ecosystem where these dimensions interact continuously, supporting sustainable teacher professional growth under digital transformation.

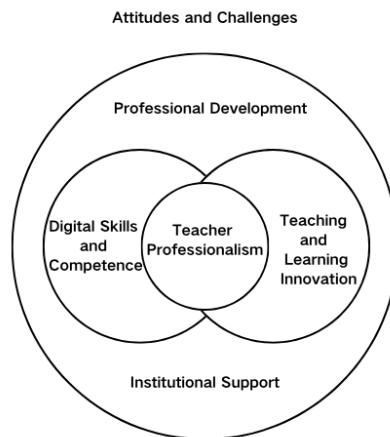


Figure 2 .The Model for Improving Teacher Professionalism under Digital Transformation

From Figure 2. The Model places Teacher Professionalism at its center, supported by two core drivers Digital Skills and Competence and Teaching and Learning Innovation which translate technological capability into pedagogical advancement. These drivers are enabled by Professional Development and Institutional Support, which provide essential training, resources, and policies that strengthen teachers' capacity for continuous improvement. Attitudes and Challenges function as a moderating layer that shapes how effectively these components interact, with positive dispositions facilitating growth and obstacles such as workload or technological limitations potentially impeding progress. The model's circular structure emphasizes that teacher development is cyclical and interactive rather than linear, sustained through ongoing feedback loops connecting institutional mechanisms, individual learning, and innovative practice. Overall, it offers a coherent, adaptable, and sustainable framework for advancing teacher professionalism in higher education under digital transformation.

Discussion

Discussion of the Current Status of Teacher Professional Development

The findings indicate that teachers at Guizhou Qiannan Economic College exhibit a generally high level of professionalism, reflecting strong competence, engagement, and integration of digital skills, pedagogical innovation, and institutional support. Digital Skills and Competence scored highly, showing that teachers are confident in using technology effectively, though advanced digital use may require ongoing targeted training. Teaching and Learning Innovation is also strong, with teachers adopting blended learning and innovative strategies, aligning with TPACK principles.

Professional Development is well-supported, emphasizing lifelong learning, reflection, and collaboration, yet areas such as long-term career planning and research participation need improvement. Institutional Support emerged as the most influential factor, demonstrating the role of organizational policies and culture in fostering professional growth. In contrast, Attitudes and Challenges scored moderately, indicating that teachers face stress, workload, and

adaptation difficulties, highlighting the need for emotional and motivational support. These results support the views of Darling-Hammond and Hyler (2022), who emphasized that effective professional development is a key driver for educational quality improvement, particularly when institutions align their support systems with teachers' evolving professional needs.

Discussion of Developing a Model for Improving Teacher Professionalism

The development of a model for improving teacher professionalism at Guizhou Qiannan Economic College underscores the interconnected nature of Digital Skills, Teaching and Learning Innovation, Professional Development, Institutional Support, and Attitudes and Challenges. The quantitative and qualitative findings demonstrated that these dimensions are mutually reinforcing, a conclusion consistent with recent theoretical and empirical perspectives. For instance, Trust and Whalen (2020) emphasized that digital competence serves as both a prerequisite and an evolving outcome of professional growth in technology-enhanced education, supporting this study's finding that Digital Skills function simultaneously as an input and a product of institutional and pedagogical influences. Similarly, Zhao et al. (2023) highlighted that innovative teaching practices are the mechanism through which digital capabilities translate into meaningful classroom transformation, echoing teachers' reflections in this study.

Institutional Support and Teaching Innovation emerged as the central driving forces—an outcome aligned with Schleicher's (2020) argument that professional growth depends heavily on systemic support structures and leadership commitment. Teachers further emphasized that digital competence initiates professional growth, while pedagogical innovation operationalizes these skills in practice, reinforcing global findings from OECD (2021) regarding technology-enabled teaching. Professional Development acted as the mediating mechanism sustaining this growth, consistent with Darling-Hammond et al. (2022), who argue that continuous training, peer collaboration, and reflective learning are essential for maintaining teacher adaptability in dynamic digital contexts. However, the study also confirmed that stress, workload, and rapid technological change continue to pose internal challenges patterns supported by Porsch and Lindner (2021), who found that emotional strain and digital fatigue can hinder teachers' engagement and innovation.

Synthesizing these perspectives, the research developed the Model for Improving Teacher Professionalism, which positions inner drivers (Digital Skills and Teaching Innovation), outer enablers (Professional Development and Institutional Support), and an overarching moderating layer (Attitudes and Challenges) within a continuous, cyclical structure. This configuration aligns with Fullan's (2021) notion that teacher development unfolds through iterative cycles of interaction among individual capacity, institutional systems, and contextual influences. The model is theoretically grounded, empirically validated through mixed-methods evidence, and broadly applicable across diverse teacher groups, reflecting contemporary views that professionalism is dynamic, adaptive, and reinforced by systemic support. Ultimately, the model provides a sustainable and evidence-based framework for enhancing teacher professionalism in the digital era.

Discussion of Expert Evaluation of the Developed Model

The expert evaluation confirmed that the Circular Ecosystem Model for Improving Teacher Professionalism is both theoretically sound and practically effective at Guizhou Qiannan Economic College, with an overall mean score of 4.58 across utility, feasibility, propriety, accuracy, and sustainability. This aligns with recent studies showing that teacher development frameworks are most effective when they incorporate multidimensional, interactive structures rather than linear processes (Zhu & Liu, 2020; Trust & Whalen, 2020).

Experts emphasized that the model's circular and systemic configuration reflects continuous professional growth, consistent with findings that technology-enhanced professionalism develops through iterative learning cycles and feedback loops (OECD, 2021; Zhao et al., 2023).

Digital Skills and Teaching Innovation were identified as the model's core drivers, supported by Professional Development and Institutional Support and moderated by Attitudes and Challenges. This corresponds with recent research highlighting that digital competence and pedagogical innovation are central determinants of teacher readiness in digital transformation (Redecker, 2020; Carrillo & Flores, 2020). The evaluation also reinforced the importance of institutional mechanisms, echoing studies showing that organizational support dramatically increases teacher engagement and sustained professional learning (Schmidt-Crawford et al., 2021; Howard et al., 2022).

Experts further noted that the model's sustainability depends on continuous feedback, structured training, and policy reinforcement an observation supported by research indicating that ongoing evaluation systems and supportive institutional policies are essential for successful long-term teacher development (Darling-Hammond et al., 2022; König et al., 2022). These scholarly findings validate the model as both a theoretical framework and a practical guide for monitoring and enhancing teacher professionalism under digital transformation. Overall, the model demonstrates adaptability, coherence, and strong potential to foster sustained professional improvement in digital higher education contexts.

Conclusion and Recommendations

Conclusion

The findings of this study indicate that teachers at Guizhou Qiannan Economic College possess a high level of professional competence, supported by strong digital skills, innovative teaching practices, continuous professional development, and institutional backing, although challenges such as emotional resilience and adaptation to rapid digital changes remain. Based on both quantitative and qualitative evidence, the Circular Ecosystem Model was developed, integrating five interrelated dimensions Digital Skills and Competence, Teaching and Learning Innovation, Professional Development, Institutional Support, and Attitudes and Challenges where digital skills and innovation act as core drivers, professional development and institutional support serve as enablers, and attitudes and challenges moderate the system, emphasizing continuous and cyclical professional growth. Expert evaluation confirmed the model's theoretical soundness, practical feasibility, and sustainability, demonstrating that it provides a coherent, adaptable, and actionable framework for guiding teacher professional development under digital transformation in higher education.

Recommendations

Recommendations for Policy

- 1) Integrate the Circular Ecosystem Model into policy to systemize digital-era teacher development in alignment with national strategies.
- 2) Strengthen continuous professional development (CPD) through annual training plans, ongoing assessment, and dedicated funding for digital pedagogy.
- 3) Enhance incentive mechanisms such as awards, promotion opportunities, and workload reductions for teachers who lead digital innovation.
- 4) Define digital competence standards to guide recruitment, appraisal, and promotion with transparent expectations.
- 5) Promote cross-sector collaboration among education agencies, technology providers, and institutions to support unified policy implementation.

6) Develop data-driven monitoring systems to track progress and refine policies based on evidence.

Recommendations for Future Research

1) Validate the model across diverse institutions to examine its generalizability and context-specific factors.

2) Conduct longitudinal research to understand long-term teacher development under digital transformation.

3) Use mixed-method approaches to explore interactions among attitudes, competence, and institutional conditions in greater depth.

4) Investigate emerging technologies such as AI, VR, and adaptive systems and how they reshape teacher professionalism.

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