

Research on Foreign Language Teacher Professional Development in the Context of Educational Digitalization

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Abstract: This study addresses the core proposition of foreign language teacher professional development amidst the intensive implementation of educational digitalization strategies. The research reveals that foreign language teachers face structural challenges including fractures in the TPACK framework induced by technological complexity, disconnects between generic training initiatives and disciplinary-specific needs, constrained professional autonomy, and the phenomenon of “dual disembedding”. To address these issues, the paper proposes a systemic innovative framework centered on “competency reconstruction—organizational collaboration—spatial integration”. This involves: at the competency level, integrating TPACK with digital leadership to enhance data-driven pedagogy and cross-cultural digital communication competence; at the organizational level, constructing multi-stakeholder collaborative mechanisms; and at the spatial level, leveraging digital technologies to create hybrid experiential learning spaces. At the practical level, it designs a tailored empowerment mechanism based on micro-credentialing pathways and a “tri-phase coupling” collaborative development model. The study aims to establish a support system for foreign language teacher development suitable for the digital era, facilitating the transition of teachers from technology users into instructional designers of smart education, thereby providing both theoretical insights and practical guidance for the high-quality digital transformation of foreign language education.

Keywords—educational digitalization; foreign language teacher; teacher professional development; evolving teacher roles; teacher role transformation

1. INTRODUCTION

Amidst the transformative leap of information technology, educational digitization has evolved from a future vision into a core driving force reshaping the global educational ecosystem (Wang et al., 2024). Emerging technologies, typified by big data, artificial intelligence, and cloud computing, are profoundly deconstructing and reconfiguring traditional paradigms of knowledge production, dissemination, acquisition, and assessment, triggering systemic transformations in educational philosophies, models, domains, and governance structures (Ma & Wu, 2024). Key national strategic documents, such as China’s Education Informatization 2.0 Action Plan, explicitly identify the digitalization of education as a critical engine underpinning and steering the modernization of education with Chinese characteristics and the construction of an education powerhouse. Within this irreversible historical surge, foreign language education, characterized by its inherent nature as situated cross-cultural communicative practice, language skill acquisition, and high dependence on contextual language construction, faces particularly profound opportunities and challenges. Digital tools not only provide unprecedented immersive, interactive, and personalized language learning environments but also pose disruptive demands on the redefinition of teachers’ and learners’ roles and required competencies.

However, foreign language teachers, who are the most agentic practitioners within the digital transformation process, exhibit a significant misalignment in their professional development (Xu, 2025). Both the World

Economic Forum and UNESCO have cautioned that the foremost risk facing global education systems is “the inability of teachers to keep pace with technological change”. For foreign language teachers, this challenge manifests as a complex pressure woven from multiple dimensions: (1) Elevated Technological Thresholds. Teachers urgently need to bridge a vast chasm spanning from fundamental media operations (e.g., utilizing online assessment tools) to the complex integration of advanced capabilities (e.g., designing AI-powered adaptive learning, applying XR technologies in cross-cultural virtual simulation scenarios). The ETS (2023) global report, Mapping Digital Teaching Competencies, revealed that a staggering 64% of foreign language teachers self-assessed significant difficulty in integrating advanced digital tools, a proportion markedly higher than that among STEM educators. (2) Reconfiguration of Pedagogical Paradigms. Within the normalized hybrid learning environment of Online-Merge-Offline (OMO) instruction, effectively embedding digital resources to reconstruct interaction mechanisms and designing tasks that synergize technological efficacy with the internal logic of language acquisition necessitates urgent pedagogical knowledge renewal. (3) Deficient Digital Ethics and Critical Literacy. Navigating environments saturated with information flows demands core competencies that are currently underdeveloped: filtering, evaluating, and selecting web-based information of linguistic pedagogical value; identifying cultural biases and ideological interference; and guiding students towards secure and responsible digital communication.

The distinctiveness of foreign language education digitization further heightens the urgency of research into

teacher professional development. Language, in its essence, is “social, situated practice” (Lave & Wenger, 1991), prompting crucial questions: How does the technology-driven “digital habitat” (Nacem et al., 2023) reconstruct the authenticity and socio-cultural depth of language interaction within virtual contexts? How can foreign language teachers guide students towards achieving embodied intercultural communication in digital environments? Addressing such questions far surpasses the simplistic application of technology.

Although models like Technological Pedagogical Content Knowledge (TPACK, Mishra & Koehler, 2006) offer a theoretical lens, the research landscape concerning discipline-specific digital professional development for foreign language teaching contains significant gaps. First, existing discourse predominantly focuses on generic technological competency frameworks, lacking deep investigation into the core discipline-specific competencies—namely, “digitally empowered language teaching strategies”. Second, systemic and empirical research on the ecological integration of development pathways—considering policy drivers, institutional support systems, individual teacher agency, and the synergy of communities of practice—remains severely limited. Third, the scarcity of documented “successful transformation cases” impedes the effective extraction and dissemination of localized, contextualized models for foreign language teachers’ digital development.

Consequently, this study centers on the core research question: “Amidst the profound advancement of the educational digitization strategy, how can foreign language teachers achieve professional development aligned with contemporary demands and disciplinary specificities?” It endeavors to conduct a multidimensional investigation into the authentic challenges and developmental needs foreign language teachers encounter in digitalized contexts (Liu et al., 2025). Furthermore, it aims to conceptualize a comprehensive developmental support framework integrating digital literacy, disciplinary pedagogical intelligence, and cross-cultural digital leadership. This research not only contributes to filling critical knowledge gaps concerning micro-level teaching practices within foreign language education research but also endeavors to provide evidence-based insights for policymakers. Its goal is to facilitate the adaptation of the teaching workforce to the transformations of the new era and empower the construction of a high-quality foreign language education system, thereby achieving dual significance in theoretical advancement and practical guidance.

2. LITERATURE REVIEW

2.1 Characteristics and Impact of Educational Digitalization Development

Educational digitalization has evolved beyond the mere application of technological tools into a revolutionary process fundamentally reshaping the education ecosystem, characterized by its systematic nature and transformative depth. At the level of deep technological integration, disruptive

technologies such as Artificial Intelligence (AI), Big Data, Cloud Computing, and Extended Reality (XR) have transitioned from supplementary aids to foundational infrastructures of the educational process (Koehler & Mishra, 2009). They have become comprehensively embedded in core functions, including curriculum design, instructional delivery (e.g., adaptive learning pathways, intelligent feedback), learning assessment (e.g., real-time data monitoring), and even educational governance (e.g., data-driven decision-making). Closely associated is the rise of a data-driven paradigm (Siemens, 2013). The comprehensive recording and analysis of learning behaviors and outcomes throughout the entire process enable a shift in educational evaluation from judgment based on experience towards precision prediction and targeted intervention. Concurrently, ubiquitous connectivity, enabled by high-speed networks and cloud platforms, has dismantled traditional physical and temporal constraints, fostering the normalization of the Online-Merge-Offline (OMO) model, which integrates online and offline, physical and virtual spaces (Xu & Yu, 2025). This shift has revitalized access to educational resources and the nature of collaborative learning. Furthermore, the openness of the educational ecosystem has become significantly pronounced. Leveraging platforms like Open Educational Resources (OER), Massive Open Online Courses (MOOCs), and virtual communities, education has transcended institutional boundaries, demonstrating vitality through wide-ranging resource sharing and cross-sectoral collaborative innovation, thereby accelerating the global flow of knowledge.

The digital transformation of education, propelled by the confluence of these characteristics, exerts multi-dimensional and profound impacts, fundamentally altering the form and substance of teaching and learning, while also prompting new reflections and challenges. For the core activity of teaching and learning itself (Fullan & Langworthy, 2014), it accelerates the shift from a teacher-centered paradigm to one centered on student-centered, personalized, inquiry-based, and collaborative learning. This necessitates the redefinition of the teacher’s role into that of a learning designer, facilitator, and competency developer. At the level of educational system operations, digitalization significantly enhances the breadth and depth of educational provision (e.g., remote sharing of high-quality resources), promotes educational equity, and reshapes educational governance models through precise, data-informed management. Simultaneously, it facilitates the emergence of flexible new pathways for learning recognition and progression, such as micro-credentials and lifelong learning credit systems. However, this development also necessitates the evolution of competency and literacy frameworks (Chiu, 2025). Digital literacy (resource evaluation, tool application), data literacy (interpretation and utilization), computational thinking, and essential capabilities for the digital age—including critical thinking and collaborative innovation—have become foundational requirements for both teachers and students. It is imperative to confront the concomitant complex challenges and potential risks (Selwyn,

2016), including inequities arising from new forms of the “digital divide”, critical issues concerning data security and privacy protection, deficiencies in critical digital literacy amidst information abundance (challenges of information overload and disinformation), and concerns regarding alienation resulting from the excessive dominance of instrumental rationality in technology. Focusing specifically on the domain of foreign language education, this transformation creates unprecedented immersive, personalized, and intelligent language learning environments (e.g., VR for cross-cultural communication, AI conversation coaches). Yet, it also imposes unprecedented high demands for the construction of authentic contexts for language acquisition, the depth of verbal interaction between teachers and students, and teachers’ digital pedagogical competence (Hockly, 2021).

2.2 Structural Evolution and Dilemmas in Foreign Language Teacher Professional Development

In the face of education’s profound digital restructuring, the substance of professional development for foreign language teachers has acquired new structural dimensions (Richards & Farrell, 2005), exhibiting characteristics of complexification and dynamic evolution. First, there is an expansion and interdisciplinary integration of the professional competence framework (Mishra & Koehler, 2006). Traditional Content Knowledge (CK) and Pedagogical Knowledge (PK) are no longer sufficient to meet current challenges. Technological Knowledge (TK) and, crucially, its deep integration with CK and PK to form Technological Pedagogical Content Knowledge (TPACK), constitute the core pillars. This manifests as: proficiency in operating intelligent technology platforms (TK), the ability to design technology-integrated language pedagogy based on learning science (TPK), and the capacity to leverage tools like XR and AI-Generated Content (AIGC) to create immersive cross-cultural language contexts and foster students’ language application abilities (TPACK). Digital Literacy (Martin & Marsh, 2006) becomes a fundamental threshold requirement, while Data Literacy empowers teachers to utilize learning analytics to optimize language teaching decisions. Concurrently, the extension of the intercultural communication context into virtual spaces necessitates the development of Digital Intercultural Competence, requiring teachers to guide students in developing intercultural sensitivity and resolving potential conflicts in digital interactions. Furthermore, teachers’ critical evaluation and information filtering capabilities, along with their competence in addressing technological ethics issues, have become indispensable components of the professional structure (Hockly, 2021).

However, this evolution in structure and requirements has not translated smoothly into practice, as foreign language teachers encounter unique, multi-layered systemic dilemmas in professional adaptation. A core challenge stems from the rapid pace of technological change far exceeding the endogenous cycle of professional development (Shonubi,

2025). On one level, the “competence gap” caused by technological complexity is widespread: many teachers (particularly veteran educators) struggle to bridge the transition from basic tool utilization to higher-order integration—such as designing AI-driven adaptive language learning modules or evaluating the efficacy of VR language environments—often lacking adequate training support (Benson et al., 2017). Secondly, there exists a significant disconnect between generic technology training and the specific pedagogical demands of teaching foreign languages: existing professional development programs frequently prioritize “technology over pedagogy,” neglecting core linguistic and pedagogical elements like language acquisition principles, integration of target language sociocultural contexts, and interactive task design. This often results in superficial technology use or misalignment with pedagogical goals (Hampel & Stickler, 2005). Third lies the dilemma of teacher empowerment and the emergence of new power structures: teachers’ professional autonomy can be constrained when confronted with platform recommendation algorithms, overwhelming resources, and standardized pre-packaged course materials. While reliant on these tools, they risk de-skilling (Selwyn, 2016). A deeper structural dilemma is the state of “dual disembedding” (O’Donnell, 2020): inherent tensions arise between teachers’ ingrained professional habits, cultural values, and traditional conceptions of successful teaching on the one hand, and the efficiency-driven, quantified, and process-oriented practices often promoted by digital technologies on the other. These intertwined dilemmas form structural barriers hindering the effective realization of digital transformation by foreign language teachers.

3. SYSTEMIC INNOVATION PERSPECTIVES AND PRACTICAL PATHWAYS

Against the backdrop of educational digital transformation, Foreign Language Teacher Professional Development (FLTPD) must transcend traditional fragmented training models, constructing an integrated three-dimensional innovative system of “Literacy Reconstruction – Organizational Synergy – Space Fusion”.

First, Literacy Innovation centers on human-technology synergies. By integrating the TPACK (Technological Pedagogical Content Knowledge) framework with the principles of digital education, this reconstitutes an intelligent educational literacy framework for teachers. It strengthens critical competencies, including: intercultural digital communication, data-driven instructional design, and human-machine collaborative assessment.

Second, leveraging Organizational Innovation through educational communities, barriers between universities, enterprises, and teaching-research institutions are dismantled, fostering an ecological collaborative mechanism. This is facilitated by smart teaching-research platforms enabling knowledge co-creation and resource sharing.

Finally, Scenario Innovation advances virtual-physical fusion. XR (Extended Reality) technologies are utilized to build embodied learning contexts for intercultural communication. AI-guided Reflective Practice Communities (RPCs) are developed, culminating in the bidirectional empowerment of teacher cognition iteration and teaching practices. Grounded in the theoretical underpinnings of Connectivist Learning Theory, this systemic innovation pathway ultimately aims for an ecological transformation of teacher professional development.

Practical implementation necessitates adherence to a "Three-Stage Coupling" pathway: (1) Individual Empowerment. Establish Micro-credentialing competence maps. Intelligent diagnostic systems identify teacher development gaps to provide customized, algorithm-recommended modular learning packages. (2) Organizational Transformation. Construct Regional Teaching-Research Brain platforms. Blockchain technology underpins decentralized repositories of teaching practices, supporting cross-school collaborative lesson study research and data-informed reflective practice. (3) Ecological Evolution. Forge a multi-stakeholder safeguard system of "Government Standard Guidance – Market Technology Support – Institutional Culture Cultivation". Implement a Digital Teacher Development Index (DTDI) assessment model, integrating intelligent educational practice as a core criterion for professional promotion.

Crucially, data ethics education must be reinforced. This guides teachers to critically navigate the relationship between technological affordances and pedagogical ethos, enabling them to maintain educator agency within AI-assisted teaching environments. This practice framework, achieved through the deep coupling of technological and educational logic, establishes a sustainably evolving, self-reinforcing cycle of professional growth for foreign language educators.

4. SYSTEM CONSTRUCTION, CHALLENGES REFLECTION, AND FUTURE DIRECTIONS

4.1 System Construction

To meet the systematic demands of educational digitalization, it is imperative to establish an integrated and dynamically evolving architecture for foreign language teachers' professional development. Its core components should encompass: (1) the infrastructure and environmental layer, (2) the digital resource application layer, (3) teacher digital literacy competencies, and (4) the collaborative development mechanism layer. This architecture is not a linear enumeration but manifests as a multi-layered, interwoven, and spiraling network structure. Its purpose is to provide teachers with a clear pathway from "technology utilization" towards "pedagogical innovation", offering tiered developmental scaffolds. For instance, it incorporates fundamental tool operation training for novice teachers and sophisticated support for intelligent pedagogical design among experienced practitioners. This approach facilitates the organic integration

of individual growth (Richards & Farrell, 2005) with ecological development (Davis et al., 2012).

4.2 Challenges and Reflection

Although a framework has begun to take shape, deep-seated structural challenges persist in practice. At the technological level, issues of tool overload and lack of contextual appropriateness coexist (e.g., the deficiency of AI feedback models genuinely aligned with second language acquisition principles), leading to teacher "choice paralysis" (Hockly, 2021). At the individual teacher level, a dual dilemma of developmental inertia and efficacy anxiety emerges: while some teachers, constrained by pedagogical workloads, adopt a passive "wait-and-see" stance towards emerging technologies, even those actively embracing digitalization frequently grapple with information disorientation and skills gaps. At the institutional design level, prevailing professional development programs often suffer from disjointed supply and weakened incentives. Training content is frequently disconnected from school-based contexts, and evaluation mechanisms disproportionately emphasise demonstrative application of technology, neglecting sustained value-added assessment of students' linguistic competence development (Mishra & Koehler, 2006). A more profound reflection concerns safeguarding the fundamental essence of language education amidst technological enablement: avoiding scenarios where immersive technologies excessively supplant authentic interpersonal linguistic interaction, and remaining vigilant against the potential for algorithmic biases to impose implicit indoctrination on cross-cultural cognition, alongside attendant data security concerns.

4.3 Future Directions

Future pathways require dedicated efforts towards precise support mechanisms and innovations in human-AI collaboration. In the short term, developing a "Teacher Digital Profile" system is essential. This system would leverage instructional behavior data to diagnose developmental bottlenecks and dynamically deliver personalized learning resources (e.g., micro-certification courses and intelligent tutors). Medium-to-long term strategies should focus on three key directions:

First, building multimodal resource-sharing consortia to promote the co-creation of open-source corpora and intelligent teaching platforms by universities, publishers, and enterprises, thereby reducing resource development costs.

Second, strengthening intelligent collaboration within community-driven teacher professional development mechanisms. Utilizing metaverse spaces for cross-regional virtual teaching research can encourage teachers to transform into resource "curators" and pedagogical architects.

Third, establishing an ethical governance framework for AI in education. This includes developing technology tools rigorously informed by language acquisition principles, implementing algorithmic transparency audits, and conducting

baseline assessments of digital literacy competencies (Selwyn, 2016). The ultimate objective is to catalyze a paradigm shift for teachers: from being “technology applicators” to becoming “leaders of educational innovation”.

5. CONCLUSION

This study systematically delineates the structural predicaments and technological adaptation barriers inherent in foreign language teacher professional development amidst educational digital transformation. It substantiates a profound dependency on the TPACK framework and underscores the critical value of cross-cultural digital leadership.

Grounding the analysis in a tri-dimensional perspective encompassing technological empowerment, ecological synergy, and ethical reflection, this research proposes a systemic developmental pathway articulated as “competency remodelling—organizational synergy—space iteration”. It emphasizes the construction of a multi-layered coupling mechanism through micro-credentialing competency mapping, a regional digital teaching-research brain platform, and hybrid physical-digital practice arenas.

The study further contends that surmounting these existing predicaments requires progress across three dimensions: (1) Micro-level. Enhancing data-driven, personalized development support. (2) Meso-level. Establishing a multi-stakeholder resource synergy network involving universities, government, enterprises, and schools. (3) Macro-level. Refining an ethical governance framework that balances technological efficacy with the fundamental principles of language education.

Future efforts should therefore prioritize deepening the innovation of human-technology collaborative educational paradigms. This will catalyze the transformation of foreign language teachers from mere technology applicators into designers of intelligent pedagogy, thereby providing theoretical guidelines and practical references for establishing a high-quality, digitally-mediated foreign language education ecosystem.

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