

Dilemmas and Support Mechanisms in the Development of Teacher Digital Literacy in the Digital Transformation of University English Classrooms

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ABSTRACT

This study explores the multifaceted dilemmas encountered in developing digital literacy among university English teachers in China, a process situated within the broader context of national educational digitalization policies. It subsequently proposes a series of integrated support mechanisms designed to address these challenges effectively. Grounded in foundational policy documents such as the "Digital Literacy of Teachers" standard (JY/T 0646—2022) and the "14th Five-Year Plan for National Informatization" (2021), this research employs a methodology based on literature review, conceptual analysis, and theoretical modeling. The key findings reveal that the dilemmas faced by educators can be categorized into four primary dimensions: technical, resource, institutional, and cognitive. In response, a four-level support framework—encompassing policy, organization, training, and community (POTC)—is proposed. This framework is designed to create synergistic effects through the interaction of its components. Theoretically, this research enriches and extends established models, including the Technology Acceptance Model (TAM) and Resource Dependence Theory. Practically, it offers actionable policy suggestions for enhancing teacher professional development within the higher education sector, contributing to the successful digital transformation of English language instruction.

Keywords: Digital transformation, English classrooms, Teacher digital literacy, Development dilemmas, Support mechanisms, Theoretical model.

1. INTRODUCTION

1.1 Research Background

China's higher education sector is currently navigating a period of profound digital transformation, a trend propelled by national policies that position informatization as a cornerstone of educational modernization (State Council of the People's Republic of China, 2021). The "14th Five-Year Plan for National Informatization" articulates a comprehensive vision for building a "Digital China," establishing priorities that include the development of ubiquitous intelligent digital infrastructure, the efficient utilization of data resources, and the cultivation of innovative development systems.

Within the educational sphere, this strategic vision translates into a concerted effort to enhance digital production forces through the integration of technologies such as artificial intelligence (AI), big data, and cloud computing. The overarching goals are to bridge the persistent urban-rural educational divide and foster high-quality, equitable development across the nation.

Providing a specific framework for educators, the "Digital Literacy of Teachers" standard (JY/T 0646—2022), issued by the Ministry of Education, defines teacher digital literacy as a composite of the consciousness, abilities, and responsibilities required to effectively use digital technologies for information processing, pedagogical problem-solving, and teaching innovation (Ministry of Education of the People's Republic of China, 2022).

This standard systematically structures digital literacy into five core dimensions: digital awareness, technical knowledge and skills, digital application, social responsibility, and professional development. For university English classrooms, the implementation of this standard necessitates the integration of a diverse array of digital tools, including Learning Management Systems (LMS), AI-assisted writing feedback platforms, and Virtual/Augmented Reality (VR/AR) applications for oral practice, all aimed at enhancing student engagement and improving learning outcomes.

However, the transition to digitally enriched pedagogical environments is not without its challenges. University English teachers, in particular, face significant hurdles in adapting their practices. While digital tools hold the potential to revolutionize language acquisition, their effective use demands a high level of digital literacy. As noted in research on similar educational contexts, persistent gaps in digital literacy among educators can hinder the effective integration of technology, leading to a series of complex developmental dilemmas.

1.2 Research Significance

This study offers significant contributions on both theoretical and practical fronts. Theoretically, it constructs a novel analytical framework by integrating insights from several influential models. These include the Technology Acceptance Model (TAM) (Davis, 1989), which explains user adoption of new technologies; Resource Dependence Theory (Pfeffer & Salancik, 1978), which illuminates organizational reliance on external resources; Institutional Theory (DiMaggio & Powell, 1983), which examines how organizational structures are shaped by normative and coercive pressures; and Cognitive Load Theory (Sweller, 1988), which addresses the mental effort involved in learning. By weaving these theoretical threads together, this research seeks to provide a more holistic explanation of the dilemmas and support mechanisms at play, thereby enriching the broader theories of educational technology acceptance. This approach addresses a notable gap in the existing literature, particularly within the Chinese context, where research has often neglected the interactive and systemic nature of these mechanisms (Zou et al., 2024).

Practically, the study provides actionable insights for a range of stakeholders, including university administrators, directors of teacher

development centers, and national policymakers. By aligning its analysis and recommendations with key national policies, such as the "Universal Digital Literacy and Skills Enhancement Action" outlined in the 14th Five-Year Plan, this research supports ongoing initiatives aimed at promoting high-quality, equitable education in the digital age (State Council of the People's Republic of China, 2021).

1.3 Research Questions

To guide this inquiry, the study is structured around three central research questions:

- What are the primary structural and behavioral dilemmas that impede the development of digital literacy among university English teachers in the current transformative era?
- How can existing organizational and institutional support mechanisms be theoretically understood in terms of their roles, effectiveness, and limitations?
- Can a comprehensive conceptual model be constructed that effectively integrates macro-level policies with the micro-level behaviors and cognitive processes of teachers to guide the development of effective support systems?

2. LITERATURE REVIEW

2.1 Concepts and Dimensions of Digital Literacy

Digital literacy is broadly defined as the ability to use digital technologies in a critical, effective, and responsible manner. International bodies have established influential frameworks for its conceptualization. UNESCO, for instance, defines digital literacy as a set of competencies essential for accessing, analyzing, and creating digital content in various forms (UNESCO, 2018). The European Union's Digital Competence Framework (DigComp) further elaborates on this concept, outlining key areas that include information and data literacy, communication and collaboration, digital content creation, safety, and problem-solving (Vuorikari et al., 2022).

Within China, the JY/T 0646—2022 standard provides a tailored framework specifically for educators, emphasizing five interconnected dimensions. These are: digital awareness, which involves recognizing the intrinsic value of technology in education; technical knowledge and

skills, encompassing the ability to understand and apply digital tools; digital application, which focuses on the pedagogical integration of technology into teaching practices; social responsibility, which pertains to the ethical and legal use of digital resources; and professional development, which underscores the necessity of ongoing learning in a rapidly evolving digital landscape (Ministry of Education of the People's Republic of China, 2022). For university English teachers, developing proficiency across these dimensions is crucial for effectively leveraging digital tools to enhance language skills instruction.

2.2 Progress in the Digital Transformation of University English Classrooms

The digital transformation of university English classrooms has made significant strides in recent years, marked by the widespread adoption of blended learning models, flipped classrooms, and the integration of AI-powered tools (Zhao & Zou, 2023). The global shift to remote and hybrid instruction in the post-COVID-19 era has acted as a catalyst, accelerating the adoption of LMS and other digital platforms in Chinese higher education, although persistent challenges remain. On a global scale, research has demonstrated the efficacy of specific technologies in language learning. For example, VR has been shown to enhance students' oral proficiency by providing immersive practice environments (Lan, 2020), while AI-driven feedback systems have proven effective in improving writing skills (Godwin-Jones, 2023).

While a growing body of research highlights the positive impact of these technologies on student motivation and academic performance, it consistently underscores that the readiness and digital competence of teachers are the most critical factors for successful implementation (Chen et al., 2024).

2.3 Theoretical Perspectives on Teacher Digital Literacy Development Dilemmas

The challenges that teachers face in developing digital literacy can be analyzed through several theoretical lenses:

- **Technical Dilemmas:** These are often explained by the Technology Acceptance Model (TAM), which posits that the adoption of a new technology is heavily influenced by its perceived ease of use and

perceived usefulness (Davis, 1989). Studies have shown that some educators, particularly those with more years of experience, may perceive new digital tools as overly complex, creating significant barriers to adoption (Chen et al., 2024).

- **Resource Dilemmas:** These challenges align with Resource Dependence Theory, which emphasizes an organization's reliance on its external environment for critical resources (Pfeffer & Salancik, 1978). In the context of digital transformation, teachers are dependent on their institutions for adequate hardware, software, high-speed internet access, and technical support. A lack of such resources, which is a documented issue in some Chinese universities, can severely constrain pedagogical innovation.
- **Institutional Dilemmas:** These can be understood through the framework of Institutional Theory. This theory suggests that organizations face both coercive pressures (e.g., policy mandates) and normative pressures (e.g., traditional teaching norms) that shape their behavior (DiMaggio & Powell, 1983). While policies like JY/T 0646—2022 create a coercive push for developing digital literacy, this can conflict with deeply entrenched traditional pedagogical norms, leading to resistance or superficial compliance, especially without aligned incentives like promotion credits for digital innovation (Zou et al., 2024).
- **Cognitive Dilemmas:** These are explained by Cognitive Load Theory, which posits that the mental effort required for learning new technologies can overload teachers' cognitive resources (Sweller, 1988). This is further compounded by burnout from sustained exposure to rapid technological changes, particularly among mid-career educators (Maslach et al., 2001).

3. THEORETICAL FRAMEWORK AND CONCEPTUAL MODEL

3.1 Conceptual Definitions

To ensure clarity, the core concepts of this study are defined as follows:

- **Teacher Digital Literacy:** Consistent with the JY/T 0646—2022 standard, this is defined as the holistic integration of digital consciousness, technical skills, pedagogical application, social responsibility, and

continuous professional development within the practice of teaching (Ministry of Education of the People's Republic of China, 2022).

- **Development Dilemmas:** These are defined as the multifaceted barriers that hinder the development of teacher digital literacy, encompassing technical, resource, institutional, and cognitive challenges.
- **Support Mechanisms:** These are multi-level interventions—policy, organizational, training, and community—that aim to mitigate dilemmas and facilitate literacy development.

3.2 Model Construction Logic

Drawing from Systems Dynamics (Stermann, 2000) and Structural Equation Modeling (SEM) logic (Kline, 2015), the model views literacy development as a dynamic system with feedback loops. The "Dilemma-Support-Literacy" three-layer interactive model captures inputs, processes, and outputs, reflecting the interplay between challenges and interventions.

3.3 Model Elements

The "Dilemma-Support-Literacy" model is structured into three layers with feedback loops, as illustrated in "Figure 1".

- **Input Layer (The Foundation):** External enablers including Policy Environment (e.g., 14th Five-Year Plan), Technical Infrastructure, Resource Allocation, and Organizational Culture, which provide the initial context for development.
- **Process Layer (The Core Interaction):** The dynamic core where challenges and interventions interact within the Teacher Internal Process (perceptions and experiences).

Development Dilemmas (Barriers): Multifaceted obstacles, categorized as technical, resource, institutional, and cognitive.

Support Mechanisms (Interventions): Multi-level countermeasures (policy, organizational, training, community) that moderate dilemmas.

- **Output Layer (The Results):** Desired outcomes, including enhanced Digital Literacy Levels, Teaching Innovation, and Classroom Digital Penetration.
- **Feedback Loops (System Dynamics):** Dashed lines in "Figure 1" depict bidirectional influences, where outputs reinforce inputs and mitigate dilemmas over time (Stermann, 2000).

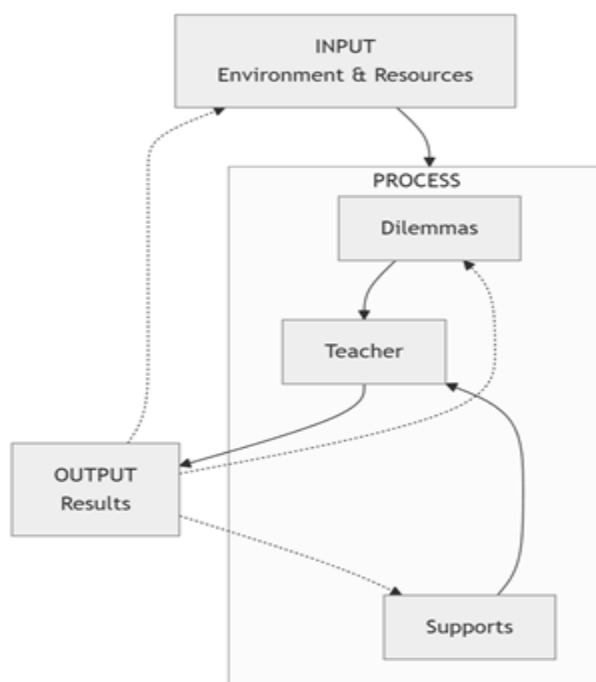


Figure 1 Conceptual diagram.

3.4 Logical Deduction

Building on the model elements in Section 3.3, the conceptual diagram (“Figure 1”) illustrates causal chains: Dilemmas cascade from technical → resource → institutional → cognitive, reducing literacy levels; support mechanisms moderate this pathway (e.g., policy incentives alleviate institutional pressure), ultimately fostering innovation. This dynamic aligns with national calls for professional development (State Council of the People's Republic of China, 2021).

[Insert Figure 1: Conceptual diagram of the Dilemma-Support-Literacy model showing layers and feedback loops. Source: image1.png]

4. THEORETICAL ANALYSIS AND DISCUSSION

4.1 Theoretical Explanation of Technical Dilemmas

The Technology Acceptance Model (TAM) posits that technology adoption is primarily driven by perceived usefulness and ease of use, yet low adoption often stems from perceived complexity, particularly among educators unfamiliar with advanced tools (Davis, 1989). In the Chinese EFL context, university English teachers frequently encounter such barriers when integrating AI-driven feedback systems or VR for immersive oral practice, viewing them as overly intricate and disruptive to traditional pedagogy, which limits the scalability of flipped classrooms (Li et al., 2025). For instance, recent empirical studies reveal that while AI tools are seen as potentially beneficial for personalized language instruction, teachers' hesitation due to technical unfamiliarity results in superficial implementation, exacerbating urban-rural divides in digital tool access (Chen et al., 2024). This technical resistance not only aligns with the foundational dilemma in the model's cascade (as per “Table 1”) but also amplifies downstream resource and cognitive loads, underscoring the need for targeted interventions in professional development.

4.2 Theoretical Explanation of Resource Dilemmas

Resource Dependence Theory underscores how organizations, including educational institutions, rely on external resources for survival and adaptation, making scarcity a critical vulnerability

in dynamic environments (Pfeffer & Salancik, 1978). In Chinese higher education, particularly rural universities, EFL teachers face acute resource shortages—such as unreliable high-speed internet, outdated hardware, or limited access to licensed software—which hinder the adoption of digital platforms like LMS for blended learning (Wang et al., 2024). These gaps are compounded by uneven national informatization efforts, where urban campuses benefit from better funding while rural ones lag, constraining innovative practices like AI-assisted writing tasks. As the most foundational dilemma (“Table 1”), this dependency directly triggers technical failures and institutional inertia, highlighting the urgency of equitable resource allocation in the 14th Five-Year Plan framework.

4.3 Theoretical Explanation of Institutional Dilemmas

Institutional Theory elucidates how coercive (e.g., regulatory mandates) and normative (e.g., cultural norms) pressures shape organizational behaviors, often leading to isomorphic resistance rather than genuine change (DiMaggio & Powell, 1983). For Chinese university English departments, the JY/T 0646—2022 standard imposes coercive requirements for digital literacy integration, yet conflicting normative traditions—such as emphasis on rote memorization over interactive tech—foster superficial compliance and resistance, especially without aligned incentives like promotion credits for digital innovation (Zhang et al., 2025). Recent explorations of AI policies in higher education reveal that unclear institutional guidelines amplify this tension, resulting in uneven adoption across faculties and perpetuating gaps in EFL pedagogy (Zou et al., 2024). As an amplifier of resource and technical dilemmas (“Table 1”), these institutional frictions underscore the model's feedback loops, where unaddressed pressures diminish overall literacy outputs.

4.4 Theoretical Explanation of Cognitive Dilemmas

Cognitive Load Theory argues that extraneous mental demands from novel tasks overwhelm working memory, impeding learning and performance, while Burnout Theory extends this to chronic emotional exhaustion from sustained overload (Sweller, 1988; Maslach et al., 2001). Among mid-career Chinese EFL teachers, juggling routine duties with mastering multifaceted digital tools—like VR simulations or AI analytics—often

induces cognitive overload, manifesting as decision fatigue and reduced motivation for tech-enhanced instruction (Zhao & Wang, 2025). Qualitative insights further link this to burnout, where technology integration exacerbates emotional strain in high-stakes exam-oriented environments,

particularly post-COVID hybrid shifts. As the culminating psychological manifestation of upstream dilemmas (Table 1), these cognitive barriers directly erode behavioral intent toward innovation, emphasizing the POTC framework's role in load reduction through tailored supports.

The interconnected nature of these four dilemmas is summarized in Table 1 below.

Table 1. Analysis of the four-fold dilemmas in teacher digital literacy development

Dilemma Dimension	Core Theoretical Support	Specific Manifestations	Interrelations
Technical	Technology Acceptance Model (TAM)	- Fear of complex software operations - Difficulty in deeply integrating technology with pedagogy - Lack of effective technical troubleshooting	Triggered by resource dilemmas and directly increases cognitive load
Resource	Resource Dependence Theory	- Insufficient or outdated hardware - Scarcity of high-quality digital teaching content - Untimely technical support	The most foundational dilemma, constraining the effectiveness of technical and institutional solutions
Institutional	Institutional Theory	- Disconnect between evaluation systems and digital teaching - Lack of effective incentives for digital innovation - Rigid administrative processes hindering reform	Amplifies the negative impact of resource and technical dilemmas; key factor in teacher disengagement
Cognitive	Cognitive Load Theory	- High time and energy cost of learning new tools - Uncertainty about the effectiveness of digital teaching - Burnout and helplessness due to lack of support	The final manifestation of the other three dilemmas at the individual psychological level; directly impacts behavioral intent

4.5 The Moderating Role of Integrated Support Mechanisms

Building on the dilemma analyses (Sections 4.1-4.4) and their interrelations ("Table 1"), the proposed four-level support framework is designed to directly moderate these dilemmas:

- **Policy Level:** At the national and institutional levels, policies can be designed to institutionalize digital literacy indicators within teacher evaluation systems and create special funds to support digital initiatives. This provides clear direction and resources, aligning with the strategic goals of the 14th Five-Year Plan (State Council of the People's Republic of China, 2021).
- **Organizational Level:** Universities can establish dedicated technical support teams, create interdisciplinary platforms for sharing best practices, and clearly define the roles and responsibilities related to digital pedagogy.
- **Training Level:** Instead of one-size-fits-all workshops, institutions can offer tiered, needs-based professional development programs that cater to teachers at different levels of digital competence, complete with follow-up support and coaching.
- **Community Level:** Fostering professional learning communities, both within and

across institutions, can provide a vital source of peer support, collaborative problem-solving, and shared practice, consistent with the principles of Communities of Practice (Wenger, 1998).

By working in concert, these support mechanisms can create a synergistic effect. For example, effective training can directly reduce the cognitive load associated with learning new technologies, while supportive community and organizational structures can mitigate feelings of isolation and burnout. "Table 2" illustrates how the POTC support system systematically addresses the four-fold dilemmas.

Table 2. Matrix of the POTC support system versus the four-fold dilemmas

	Technical Dilemma	Resource Dilemma	Institutional Dilemma	Cognitive Dilemma
Policy Support	Sets technical standards and goals	Allocates special funds to ensure resource investment	Integrates digital literacy into evaluation & promotion systems	Fosters a macro-environment that encourages innovation and tolerates failure
Organizational Support	Establishes rapid-response technical support teams	Coordinates procurement of hardware/software; builds institutional resource repositories	Creates specific incentive measures and workload recognition methods	Provides interdisciplinary platforms to reduce individual burdens
Training Support	Provides tiered, practical, hands-on skills training	Offers training on how to effectively use and create digital resources	Explains policies and clarifies the direction of reform	Lowers the learning curve and builds successful experiences to enhance self-efficacy
Community Support	Peers share practical tips and troubleshooting experiences	Share self-made resources and best practices	Forms consensus for reform, promoting bottom-up institutional optimization	Provides emotional support, shares success stories, and alleviates anxiety and burnout

5. CONCLUSIONS AND POLICY SUGGESTIONS

5.1 Main Conclusions

This study has theoretically established that the development of digital literacy among university English teachers is hindered by a complex interplay of technical, resource, institutional, and cognitive dilemmas. It has further argued that these challenges can be effectively addressed through a multi-layered support system that integrates policy, organizational, training, and community-level interventions. The synergy created by these interacting support mechanisms is crucial for fostering an environment where teachers can develop the advanced digital competencies required for modern language education.

5.2 Theoretical Significance

The primary theoretical contribution of this research is the development of the "Dilemma-Support-Literacy" model. This integrated framework enriches existing technology acceptance and organizational support theories by providing a more nuanced and contextually specific explanation of the challenges and enablers of teacher professional development in the digital age. It offers a valuable conceptual tool for future empirical research in this area.

5.3 Practical Suggestions

Based on the theoretical analysis, the following practical suggestions are proposed for stakeholders in Chinese higher education:

- For Policymakers: Integrate digital literacy indicators into formal teacher assessment

and promotion criteria. Establish dedicated national and provincial funds to support the acquisition of digital resources and the development of high-quality training programs, as mandated by the Ministry of Education (Ministry of Education of the People's Republic of China, 2022).

- For University Organizations: Develop clear institutional strategies for digital transformation. Establish cross-departmental platforms to promote collaboration between English departments and technical support units. Clearly define responsibilities to ensure that teachers receive timely and effective assistance.
- For Teacher Training Programs: Design and implement tiered professional development programs that are tailored to the specific needs and existing skill levels of teachers. Move beyond one-off workshops to a model of continuous, job-embedded learning with regular evaluation and feedback.
- For Building Communities: Actively foster the creation of professional learning communities where teachers can share experiences, co-develop digital teaching materials, and engage in peer review and mentorship.

5.4 Research Limitations and Future Directions

The primary limitation of this study is its theoretical and conceptual nature. While it provides a robust framework grounded in established theories, it lacks empirical validation. Future research should aim to operationalize the "Dilemma-Support-Literacy" model and test its hypothesized relationships through empirical

methods, such as large-scale surveys and in-depth case studies conducted within university English departments. Such research would provide valuable data to further refine the model and inform the development of evidence-based policies and practices.

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