

Unpacking Chinese EFL Teachers' TPACK Challenges in Online Teaching

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Abstract

The integration of online teaching into higher education necessitates a deep understanding of the sustained challenges teachers face. This qualitative study investigates the Technological Pedagogical Content Knowledge (TPACK) challenges encountered by Chinese university-level English as a Foreign Language (EFL) teachers in their online practice. Data collected through semi-structured interviews with 10 teachers were analyzed thematically using the TPACK framework as a diagnostic lens. The findings reveal that the core impediments reside not in isolated knowledge domains but in the integrative components of TPACK. Specifically, teachers faced significant difficulties in Technological Pedagogical Knowledge (TPK), struggling to design meaningful communicative activities and to monitor student engagement effectively online. Concurrently, they encountered substantial challenges in Technological Content Knowledge (TCK), including sourcing level-appropriate digital materials and managing cumbersome workflows across fragmented platforms. The study concludes that a deficit in synthesizing technological, pedagogical, and content knowledge underpins these struggles. It underscores the need for targeted professional development that moves beyond technical training to explicitly foster the integrative capacities essential for effective online language teaching.

Plain Language Summary

Understanding the Hurdles for English Teachers in China's Online Teaching

As online teaching becomes a permanent part of education, it's crucial to understand the real and ongoing challenges that teachers face. This study listened to the experiences of ten university English teachers in China who have been teaching online for a sustained period. We found that their main struggles were not about how to use the technology itself, but about how to successfully combine their knowledge of technology, teaching methods, and the English language. Specifically, the teachers reported significant difficulties in two key areas: 1. Designing Interactive Learning: They found it hard to create online activities that would get students to truly communicate and practice speaking English with each other, often resulting in silent breakout rooms or students switching to their native language. 2. Finding and Managing Digital Resources: They spent excessive time searching for suitable online teaching materials, only to find that most were a poor fit for their students' level. They also felt exhausted from juggling multiple different apps and platforms to teach a single, coherent lesson. The study concludes that the core problem is a gap in teachers' ability to integrate technology with their teaching expertise, not a lack of technical skills. To help teachers succeed,

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Data Availability Statement included at the end of the article



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professional development must move beyond simple software training. Instead, support should focus on helping teachers design meaningful online interactions and curate high-quality digital content. Schools can also help by providing shared databases of vetted teaching resources.

Keywords

technological pedagogical content knowledge (TPACK), online teaching, EFL teachers, qualitative study, teacher professional development

Introduction

The integration of technology into education has profoundly reshaped the terrain of English as a Foreign Language (EFL) teaching in higher education worldwide. Digital tools and online platforms present significant potential for enhancing language acquisition by facilitating access to authentic materials, enabling interactive learning environments, and promoting learner autonomy (Tütüniş et al., 2022). The post-pandemic era has accelerated this shift, solidifying online teaching as a persistent and integral element of the global higher education ecosystem (Guppy et al., 2022; Lucas & Vicente, 2023). However, effectively leveraging technology is a complex process that demands more than technical proficiency; it requires a sophisticated synthesis of technological, pedagogical, and content knowledge within teachers (Huang et al., 2022).

In China, this transition is characterized by top-down policy initiatives. The “*Education Informatization 2.0 Action Plan*” (Ministry of Education of the People’s Republic of China, 2018) called for a fundamental shift in teaching beliefs, methods, and roles to elevate teachers’ information literacy. This directive was further reinforced by “*China’s Education Modernization 2035*” (Ministry of Education of the People’s Republic of China, 2019), which emphasized advancing competencies in information literacy, professionalism, and creativity, urging teachers to adapt to the evolving educational landscape. Despite this potent policy impetus, a palpable gap persists between mandate and classroom reality (Huang et al., 2021). As technology evolved from a supplementary aid to an essential instructional medium, EFL teachers encountered substantial difficulties, which underscores a critical misalignment between policy expectations and teaching practice. Research increasingly suggests that the core impediments are not primarily hardware-related but are embedded within teachers’ knowledge structures—specifically, their capacity to synergistically integrate technology, pedagogy, and content (Chen et al., 2022). This is precisely the domain of the Technological Pedagogical Content Knowledge

(TPACK) framework (Mishra & Koehler, 2006). While TPACK provides a robust framework, understanding the specific nature of integration challenges within the unique Chinese EFL online context requires a diagnostic approach that moves beyond self-reported surveys.

Empirical evidence from the Chinese EFL context confirms that while teachers express confidence in their core pedagogical (PK) and content knowledge (CK), they report significantly lower confidence in their technological knowledge (TK) and, crucially, in their ability to integrate technology with pedagogy and content (i.e., TPK and TCK; Shi & Jiang, 2022). For instance, technology use often remains superficial, serving primarily for information presentation rather than enabling deeper pedagogical transformation (Shi & Jiang, 2022). Consequently, the critical inquiry shifts from merely whether teachers use technology to what specific and persistent challenges they face at the level of knowledge integration as they endeavor to weave digital tools meaningfully into their instructional practices.

While the dominant quantitative paradigm has valuably mapped TPACK proficiency through surveys (e.g., Alhamid & Mohammad-Salehi, 2024), it seldom provides qualitative depth to unpack how TPK and TCK challenges manifest in the lived experience of sustained online teaching (Jiménez Sierra et al., 2023). Recent research employing qualitative methods has begun to call for a deeper investigation into the specific manifestations of these challenges (Chen et al., 2022). A nuanced understanding of the specific dilemmas, decision-making processes, and contextual constraints teachers navigate in their knowledge integration remains underdeveloped (Willermark, 2018).

To address this gap, the present study employs the TPACK framework not merely as a descriptive taxonomy but as a powerful diagnostic lens (Mishra & Koehler, 2006). It guides a qualitative investigation into the following research question:

What are the specific TPK and TCK-related challenges that Chinese EFL teachers encounter in sustained online teaching?

By applying this framework to interrogate rich qualitative data, this study aims to move beyond identification to perform an analysis that traces practical difficulties to their origins in the integration of knowledge domains. The findings are positioned to offer an actionable blueprint for designing targeted professional development, moving beyond generic technical training to support the sophisticated knowledge synthesis required for sustainable and effective online language teaching.

Literature Review

TPACK Framework

The Technological Pedagogical Content Knowledge (TPACK) framework, introduced by Mishra and Koehler (2006), has become a preeminent theoretical model for conceptualizing the knowledge teachers require to integrate technology effectively into their practice. Building upon Shulman's (1986) foundational concept of Pedagogical Content Knowledge (PCK), TPACK expands the knowledge base to include the dynamic and synergistic interplay between three core domains: Content Knowledge (CK), Pedagogical Knowledge (PK), and Technological Knowledge (TK). This framework posits that effective technology integration is not merely an additive process but a transformative one, occurring at the intersections of these knowledge domains (Mishra & Koehler, 2009). These intersections give rise to the integrative components of the model: Technological Content Knowledge (TCK), an understanding of how technology and content influence each other; Technological Pedagogical Knowledge (TPK), a competence in using technology to implement pedagogical strategies; and Pedagogical Content Knowledge (PCK). The culmination of this complex interplay is TPACK itself—the specialized, contextually situated knowledge required to design and facilitate technology-enhanced learning for specific subject matter (as shown in Figure 1).

While the framework's structure is widely adopted, scholarly discourse continues regarding its theoretical nuances. Some scholars view TPACK as a direct extension of PCK, with technology acting as a supportive tool (Niess, 2005). Others advocate for a more holistic, synergistic view where TK, CK, and PK are co-dependent and mutually influencing, leading to a transformative knowledge synthesis that is greater than the sum of its parts (Mishra & Koehler, 2009). A critical advancement in this discourse is the emphasis on context as an indispensable element enveloping the entire framework. Research confirms that macro-factors like national policies and micro-factors such as teachers' beliefs and institutional culture profoundly shape how TPACK is understood and enacted (Porrás-Hernández & Salinas-Amescua, 2013;

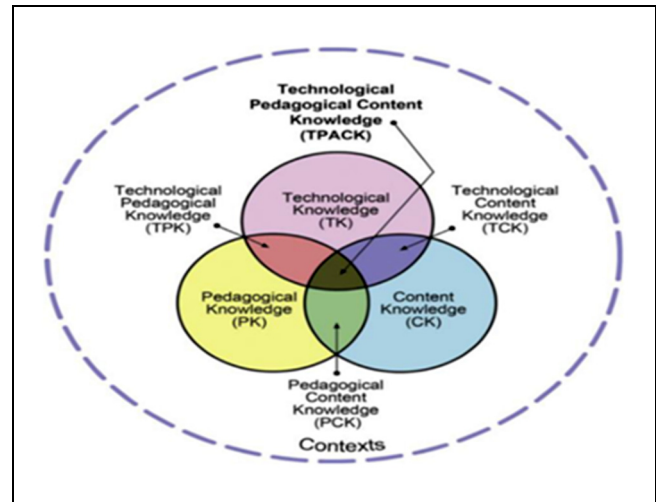


Figure 1. The TPACK framework.

Source. Mishra and Koehler (2006).

Roussinos & Jimoyiannis, 2019). This aligns with constructivist principles, positioning TPACK as a constructivist approach where technology can create interactive environments for knowledge construction (Chai & Koh, 2017).

The framework's utility has spurred extensive global research, much of which has focused on measuring TPACK proficiency through quantitative surveys, examining its relationship with factors like technology adoption (Joo et al., 2018), teacher self-efficacy (Eichelberger & Leong, 2019), and demographic variables (Roussinos & Jimoyiannis, 2019). Bibliometric analyses confirm the sustained and growing research interest in the construct (Soler-Costa et al., 2021). However, this quantitative paradigm, while valuable for identifying broad patterns and correlations, possesses its limitation. It is less capable of providing qualitative depth to unpack how the challenges within the integrative knowledge domains. Therefore, for the present study, the TPACK framework is employed as a powerful diagnostic lens. It provides the theoretical structure to move beyond listing surface-level difficulties in online EFL teaching toward a deeper, analytical investigation. It enables the tracing of reported challenges back to their potential roots in specific disjuncture within the teacher's knowledge system.

Research on TPACK Among EFL Teachers in Online Teaching

The application of the TPACK framework to EFL teaching contexts has generated significant research interest, revealing both unique challenges and pathways for development. Globally, studies have established that technology integration in language education is most effective

when it moves beyond technical skills to embrace the dynamic interplay of technological, pedagogical, and content-specific knowledge (Habibi et al., 2020; Tseng et al., 2019). This body of work underscores that meaningful integration requires a sophisticated synthesis of knowledge unique to language acquisition (Ziphorah, 2014).

A consistent finding across diverse educational contexts is the distinctive profile of EFL teachers' TPACK. Beyond identifying the general confidence gap in integrative knowledge domains, a more nuanced line of inquiry examines the nature of these TPK and TCK challenges. Research suggests that the obstacle is not merely a lack of skill, but often a disconnect between teachers' existing pedagogical beliefs and the epistemological demands of technology-rich environments. For instance, teachers with deeply held transmissive beliefs may utilize technology primarily for content delivery, thereby underutilizing its potential for facilitating interactive and constructivist language learning activities—a core TPK challenge (Muliani et al., 2024). Similarly, the difficulty in developing TCK can be linked to a lack of exposure to or training in digital resources that are authentically aligned with specific language learning objectives, leading to a reliance on generic tools that do not adequately support the target content (Habibi et al., 2020). This gap becomes critically exposed in online teaching environments, where the demand for designing technology-mediated interactions (TPK) and selecting digital resources that exemplify language points (TCK) is paramount. The barriers to developing this integrated knowledge base are complex, often stemming from a misalignment between traditional, transmission-based teaching beliefs and the student-centered ethos of many digital tools, a challenge noted in both Eastern and Western contexts (Eichelberger & Leong, 2019).

In response, scholarship has explored various avenues for fostering TPACK. Research on professional development suggests that strategies like Lesson Study are effective in reshaping teachers' conceptions of technology-integrated instruction (Jiménez Sierra et al., 2023). Furthermore, pedagogical models such as Project-Based Learning (PBL) and the flipped classroom have been successfully operationalized through the TPACK lens, demonstrating its utility in creating structured, technology-enhanced language learning experiences (Bauer-Ramazani & Sabieh, 2018). These approaches highlight that TPACK development is a contextualized and often non-linear process, influenced by factors ranging from teachers' self-efficacy to institutional support (Roussinos & Jimoyiannis, 2019).

Quantitative corpus has been essential in establishing the what and where of TPACK deficiencies, however, scholars are increasingly advocating for a complementary

shift toward qualitative inquiry to unravel the how and why of teachers' knowledge enactment in authentic settings (Santos & Castro, 2021). This call is particularly pertinent in the Chinese EFL context, where unique situational factors, such as the pressure of standardized testing and large class sizes, are well-documented as forces that profoundly shape pedagogical choices (Li, 2014; Liu et al., 2014). However, the precise mechanisms through which these specific contextual pressures interact with and amplify TPK and TCK challenges during the dynamic process of online lesson planning and delivery remain inadequately understood. The existing literature lacks fine-grained evidence detailing the in-the-moment reasoning and adaptive strategies teachers employ when, for instance, a technological failure disrupts a planned speaking activity—a TPK dilemma, or the cognitive processes underlying their critical evaluation and selection of digital resources to illustrate a specific grammatical rule—a TCK dilemma, (Debbagh & Jones, 2018; Tseng et al., 2019). This gap in understanding the lived experience of TPACK integration underscores the necessity for a contextualized, diagnostic investigation. Therefore, this study is designed to respond to this identified need by tracing the manifestation of integration challenges especially with technology in their sustained online teaching practice.

Methodology

Research Design and Theoretical Framework

This study adopted a qualitative approach to deeply investigate the inherent challenges Chinese EFL teachers face in their online teaching practice. Specifically, the research design was guided and informed by the TPACK framework (Mishra & Koehler, 2006). This framework served as the primary analytical lens throughout the study, shaping the research questions, data collection, and interpretation of findings.

A qualitative methodology was appropriate as it allows for an in-depth exploration of complex, context-specific phenomena. In this case, it facilitates exploration of the “how” and “why” behind teachers' reported difficulties in integrating technology, pedagogy, and content knowledge (Creswell & Poth, 2016). Semi-structured interviews were employed as the primary data collection instrument, as they provide both focus on the core TPACK dimensions and the flexibility to explore participants' unique, unanticipated experiences.

Research Context

This study investigates online teaching as a deliberate and stable mode of instruction, formally integrated into the university curriculum. It specifically examines the online components of hybrid courses and fully online

Table 1. Basic Information of Participants Interviewed.

Pseudonym	Gender	Teaching years	Highest degree	Academic rank	Course taught	Class size	Apps/Teaching platforms
Emma	F	3	MA	Assistant Lecture	Public English	101	Ding Talk; Cidaren; WeChat
Alex	M	9	PhD	Lecture	Public English	128	Ding Talk; Cidaren; We Learn; WeChat
Lily	F	15	MA	Lecture	Comprehensive English	45	Ding Talk; Chaoxing; WeChat; Mooc
Ben	M	18	MA	Associate Professor	Public English	98	Ding Talk; Cidaren; We Learn; Cloud Class; WeChat
Olivia	F	34	MA	Professor	Western Culture	43	Ding Talk; Cidaren; We Learn; WeChat; Mooc
David	M	20	MA	Associate Professor	Public English	118	Ding Talk; Cidaren; We Learn; Chaoxing; WeChat
Sophia	F	12	MA	Lecture	Business English	55	Ding Talk; Chaoxing; WeChat; Mooc
Mia	F	14	MA	Lecture	Reading	45	Ding Talk; Rain Class; WeChat; Mooc
Chloe	F	8	MA	Lecture	Listening & speaking	48	Ding Talk; Cidaren; We Learn; Chaoxing; WeChat
Zoe	F	6	MA	Lecture	Comprehensive English	46	Ding Talk; Cidaren; We Learn; Chaoxing; WeChat

offerings, distinguishing the focus from the earlier phase of emergency remote teaching adopted during the Covid-19 pandemic.

The research was conducted at a university where EFL faculty have substantial and evolving experience with technology-mediated instruction. Their practice has transitioned from using technology as a supplementary tool pre-pandemic, to exclusive online delivery during the crisis, and now to sustaining a hybrid model. This trajectory—particularly their experience with long-term, formally adopted online and hybrid practice—makes them a highly pertinent participant group. It allows the investigation to move beyond the initial challenges of rapid transition and to concentrate on the sustained TPACK challenges inherent in a matured, institutionalized online teaching environment.

Participants

A purposive sampling strategy with maximum variation (Patton, 1990) was employed to recruit participants. Recruitment concluded with a final sample of 10 EFL teachers, as subsequent interviews yielded redundant data regarding the core TPACK challenges, indicating thematic saturation had been reached. The sample was intentionally diversified across key dimensions relevant to the study, including gender, teaching years, academic rank, and courses taught to ensure a comprehensive range of experiences. To protect participants' confidentiality, all participants were assigned pseudonyms throughout the study. The pseudonyms are not associated with participants' real identities and are used solely for distinction. Their detailed demographics are presented in Table 1.

Data Collection

Data for this study were collected through face-to-face, semi-structured interviews, utilizing a protocol specifically designed around the TPACK framework (Mishra & Koehler, 2006) shown in Table A1. This method was selected for its capacity to generate rich, qualitative data by allowing participants to elaborate on their experiences while ensuring the conversation remained focused on the theoretically derived topics central to the research questions (Bryman, 2016).

A total of 10 interviews were conducted between January 15 and February 25, 2025. Each session began with obtaining informed consent, ensuring confidentiality, and securing permission for audio recording. The interviews, which ranged from 43 to 153 min in duration (averaging 102 min), were transcribed verbatim for analysis. The variation in interview length reflected the natural flow of conversation and the depth of detail shared

by participants, with all interviews providing substantial and relevant data for the thematic analysis. In addition to audio recordings, supplementary materials such as pictures and screenshots provided by participants were collected to facilitate data triangulation and enhance the contextual richness of the data. Recruitment and data collection continued until thematic saturation was achieved, with no new substantive insights emerging after the 10th interview.

Data Analysis

The data were analyzed following the systematic six-phase thematic analysis framework outlined by Braun and Clarke (2006). Meanwhile, the TPACK model serving as an essential analytical lens throughout the process ensured the findings both data-grounded and theoretically meaningful. Specifically, the analysis involved the following phases:

1. **Familiarizing with the Data:** the analysis commenced with immersion in the data, which involved repeated listening to interview recordings and active reading of verbatim transcripts to gain a deep understanding of the content.
2. **Generating Initial Codes:** significant statements were systematically identified and assigned concise, descriptive labels through an iterative process of open coding. For example, the participant statement, *"I know how to use breakout rooms, but I don't know how to design a good speaking task for them,"* was initially coded as "Difficulty designing technology-mediated activities."
3. **Searching for Themes:** the initial codes were collated and grouped into potential themes. During this phase, the TPACK framework was actively applied to organize and interpret the data. The aforementioned code was consequently categorized under the TPK and TCK dimensions.
4. **Reviewing Themes:** the candidate themes were rigorously reviewed and refined by checking them against the coded extracts and the entire dataset. To enhance analytic reliability, the researchers independently coded a subset of the transcripts (approximately 30%). The inter-coder agreement, measured by Cohen's Kappa, reached .81, indicating a high level of consistency. All discrepancies were resolved through discussion until a full consensus was achieved.
5. **Defining and Naming Themes:** each theme was clearly defined to capture its core essence, and a concise, informative name was developed for the final thematic structure.

6. **Producing the Report:** the analysis was synthesized into the coherent narrative presented in the Findings section.

To ensure the trustworthiness of the study, the concrete strategies were employed. Researcher bias was mitigated through iterative reflexive journaling maintained after each interview, enabling ongoing critical reflection across all phases of the inquiry. The participant cohort was assembled with attention to varied backgrounds, aiming to reflect the diversity in the wider EFL teaching community. To strengthen analytical consistency, investigator triangulation was implemented via structured debriefing sessions and cross-examination of coding frameworks and thematic interpretations until mutual agreement was attained. Upon consolidation of the findings, a synthesis was circulated to participants for respondent validation, serving to reinforce the credibility of the interpretive process. All the measures further validated the rigor of the study.

The qualitative data analysis software NVivo (version 12) was used as well to manage and organize the data throughout this process. This rigorous and transparent procedure ensured that the findings are both grounded in the data and theoretically informed. A detailed illustration of the coding process, from data excerpts to final themes, is provided in Table B1.

Research Ethics

This study was conducted in strict adherence to recognized ethical standards for research with human subjects. Ethical approval was granted by the Institutional Review Board of the authors' university prior to the commencement of data collection.

Informed consent was obtained in a rigorous process to ensure participants' full autonomy. Prior to data collection, all participants were provided with a detailed written information sheet outlining the research aims, procedures, potential risks and benefits, and their core rights—including the right to withdraw at any time without negative consequences or penalty. The researchers also verbally reiterated these key points at the start of each interview to address any questions and confirm understanding, and written informed consent was obtained from each participant before formal data collection began.

To limit potential harm to participants, the study design focused exclusively on professional experiences (e.g., online teaching TPACK challenges) and avoided sensitive topics (e.g., personal privacy, political views) that could cause discomfort. The potential benefits of this research outweigh any minimal risks: for society, the findings offer empirical insights to optimize EFL digital

teaching training and curriculum design; for participants themselves, articulating teaching challenges fostered reflective professional growth.

To protect participant anonymity and confidentiality, all identifying information was removed from the data. Participants are referred to exclusively by pseudonyms (e.g., Emma, Zoe) throughout this manuscript. All digital data, including audio recordings and transcripts, were stored on a password-protected secure server, with access limited to the core research team. These measures ensured that the privacy of the participants was rigorously maintained throughout the research process and in the dissemination of findings.

Findings From the Thematic Analysis

Thematic analysis of the interview data was guided by the research questions and the TPACK framework. The analysis was structured around the framework's integrative knowledge domains—specifically TPK and TCK—to uncover the specific manifestations of challenges within them. The findings are organized below according to these two domains.

Challenges in Technological Pedagogical Knowledge (TPK)

This theme encapsulates the profound difficulties teachers encountered when attempting to blend their knowledge of technology with their knowledge of teaching methods. The challenges here were not about an inability to operate the tools, but about a gap in knowing how to deploy these tools to achieve specific pedagogical goals in an online environment. This TPK gap manifested in several critical areas of their teaching practice.

The Inability to Foster Meaningful Communicative Interaction

A predominant issue reported by teachers was their struggle to design technology-mediated tasks that effectively promoted spontaneous and meaningful communication in English. While teachers were often adept at using interactive features like breakout rooms, they lacked the pedagogical strategies to structure these tools for authentic language use, often resulting in student silence or off-task communication in their first language.

Teachers expressed this specific frustration, highlighting a clear disconnect between tool function and pedagogical application. One teacher elaborated on this dilemma, stating:

I know how to use the “breakout room” function in DingTalk, but I don’t know how to design a task that truly

prompts students to communicate in English. As a result, they just chatted in Chinese inside. The function is there, but my ability to make it work for language learning is not. (Lily)

This sentiment was also expressed by other participants, pointing to a shared TPK deficit. Another teacher confirmed the complete absence of collaborative learning in their online classes, noting:

I didn’t conduct any activities in my online teaching. Not any interaction between students. I didn’t know how to carry out some online group activities, role plays, sitcoms or whatever. The main interaction was question and answer in my class, which I could control, but I knew it wasn’t enough. (Ben)

A third teacher expressed similar frustration, highlighting the logistical and pedagogical uncertainty that prevented them from even attempting such activities:

Students were scattered, so how to conduct activities? Students would ask some questions after I finished the class, but there were no group activities in my class. So, I would ask other teachers how to do that, but everyone seemed to be figuring it out on their own. (Alex)

Collectively, these accounts point to a pronounced TPK gap. The technological capabilities for interaction were available, but the teachers lacked the integrated knowledge to design pedagogical scaffolds and tasks that would transform these tools into effective conduits for communicative language practice, ultimately limiting the interactive potential of their online classrooms.

The Constraints of an Impoverished Feedback Loop

The transition to the online environment was consistently described as a loss of the rich, non-verbal data stream that teachers rely on for real-time instructional adjustments. The inability to “read the room”—to perceive confused expressions, boredom, or engagement—created a significant pedagogical blind spot, severely impeding their capacity for formative assessment and dynamic teaching.

Teachers vividly described this sensory and emotional disconnect. One teacher explained the critical missing element in their teaching process:

In the online classroom, I’ve lost the ability to “read the room.” I can’t see their confused or bored expressions, which makes it very difficult to adjust my teaching pace and depth in real-time. It’s like flying blind; you just keep going according to the plan, hoping they are following, but you have no real-time confirmation. (Sophia)

This loss extended beyond academic comprehension to the very fabric of the classroom community. Another

participant reflected on the profound emotional distance created by the screen, sharing a student's poignant feedback:

Although teachers and students were separated only by a screen, this distance was actually very far. I was told by students that I was his most familiar stranger. (Lily)

Lacking this face-to-face communication, teachers and students were strangers to each other. Students gave me feedback that he didn't feel the atmosphere of the class and he didn't feel he was having class despite some interaction in class. (Lily)

This illustrates a classic TPK dilemma: possessing the TK to operate a tool, but lacking the pedagogical design (PK) to leverage it for core language learning objectives (CK). Further emphasizing the importance of non-verbal cues that were lost, another teacher stated:

The crucial interaction between teachers and students, facilitated through body language and eye contact, is integral to a successful teaching process; however, such interaction is unattainable in online teaching. Furthermore, my students frequently voice their dissatisfaction with the limited interaction among peers in online classes. (Zoe)

This shared experience underscores a critical TPK challenge: the knowledge of how to monitor, interpret, and respond to student cues is fundamentally altered within the specific affordances and constraints of a digital medium. Without the capacity for spontaneous, non-verbal interaction, teachers' pedagogical capacity for dynamic responsiveness and building a cohesive learning community was significantly constrained.

Inefficiencies and Perceived Ineffectiveness in Digital Assessment

In the domain of assessment, teachers reported significant frustrations as their established, efficient methods for providing feedback failed to translate effectively to the digital environment. The shift from quick, symbolic marking on paper to typing lengthy comments in digital documents was consistently described as time-consuming and perceived as less impactful, revealing a specific TPK gap in technology-enhanced assessment strategies.

A clear example of this struggle came from a teacher experienced in grading essays online, who reported:

Grading essays online is time-consuming. I have to type long comments into the document; unlike the quick circling and shorthand I can use on paper. I doubt students even read

those lengthy text feedback. It feels so much less efficient and I'm not convinced it helps them learn more. (Olivia)

This experience highlights a stark disconnect between traditional assessment practices and their digital implementation. While automated grading of multiple-choice quizzes was acknowledged as a benefit of the platforms, the nuanced feedback on complex, subjective tasks like writing and speaking suffered. Teachers had not yet developed or adopted digital feedback methodologies—such as the efficient use of voice comments, screencast video feedback, or rubric-based tools seamlessly integrated into their platforms—that could replicate the efficiency and perceived impact of their face-to-face practices. This represents a specific TPK deficit in the realm of assessment pedagogy for the online context, where the technology is used to replicate an old process rather than to enable a new, more effective one.

Challenges in Technological Content Knowledge (TCK)

This theme captures the significant challenges that emerged from the interplay between technology and the specific content of English language teaching. The difficulties here were not primarily about pedagogy in a general sense, but about a disconnect between the available digital tools and resources and the specific linguistic concepts and skills being taught. Teachers struggled to find and utilize technologies that were appropriately aligned with their subject matter.

The Scarcity of Level- and Context-Appropriate Digital Materials

A central and time-consuming challenge was the immense difficulty in locating digital resources that were not only linguistically accurate but also pedagogically suitable for the students' proficiency level and culturally relevant within the Chinese EFL context. Teachers reported spending hours sifting through online repositories, only to find that most resources were a poor fit for their specific teaching points, indicating a gap in their knowledge of how specific content is best represented through technology.

This struggle was perfectly captured by a teacher's extensive quest for a specific grammar resource, who explained:

I spent hours searching for a short video that clearly illustrates the usage of the "present perfect tense" in a real-life context, but most resources were either too simplistic or too advanced for my students. It's incredibly frustrating because

you waste a whole evening looking for that one perfect clip that explains it just right for your class, and it often doesn't exist. (Alex)

This statement epitomizes the TCK challenge. The teacher's objective was clear from a content knowledge (CK) perspective, and the technological knowledge (TK) to search was present. However, the integrative knowledge of which technological resources effectively represent this specific content for this specific audience was lacking. The problem was not a universal lack of resources, but a scarcity of resources that demonstrated a coherent fusion of the content, the technology, and the learner's context. While teachers acknowledged the "rich resources" available online (Sophia, Mia), the practical task of finding the "just-right" material for a given lesson remained a persistent and time-consuming challenge, pointing to a critical area for TCK development.

The Challenge of Cumbersome Workflows in Integrated Skills Instruction

A systemic TCK challenge arose from the inherent misalignment between the design of common digital platforms and the pedagogical workflows required for effective, integrated language teaching. Instead of experiencing technology as a seamless support, teachers often found themselves managing a fragmented array of tools and platforms to deliver a single coherent lesson. This juggling act led to exhaustion for themselves and confusion for their students, particularly for teaching skills like listening that inherently involve multiple media.

This was acutely described by a teacher focusing on listening comprehension, who reported:

I feel more exhausted teaching listening online. I have to juggle between multiple platforms to upload audio files, subtitles, and exercises, and students often get confused by the process. The audio file is on one platform, the comprehension questions are on another, and the discussion about the content is in a third place like the chat. It's inefficient and breaks the flow of learning. (Chloe)

This experience highlights a TCK deficit at a systemic level. The available technological tools (TK) were not designed around the logical, integrated workflow of language skill instruction (CK). Teachers were forced to create cumbersome workarounds, patching together multiple applications to deliver a coherent learning experience. This fragmentation placed a significant cognitive and logistical burden on the teachers, diverting their energy from teaching the content itself to managing the technology that was supposed to deliver it. The platforms, in this sense, were not "fit-for-purpose" for the specific content of language education, revealing a

fundamental disconnect between technological design and content-specific pedagogical needs.

The Deficiency in Critiquing and Adapting Digital Materials

Beyond the challenge of locating seemingly appropriate resources, a more advanced TCK deficit emerged in teachers' limited capacity to critically evaluate the pedagogical quality of digital materials and to effectively adapt them for their specific instructional purposes. Finding a resource was often only the first step; the subsequent steps of evaluating its shortcomings and making necessary modifications required a deep integration of content knowledge and technological skill, which many teachers found lacking.

The interview data revealed that teachers could identify when a resource was "not quite right," but they often struggled to articulate the specific content-pedagogical reasons why, or to take corrective action beyond abandoning the resource and continuing their search. The earlier quote about the present perfect tense video is evidence of this; the teacher identified a mismatch in linguistic complexity but did not mention strategies for adapting the resource, such as using a video editor to segment it, providing supplementary vocabulary support, or designing pre-viewing and post-viewing tasks to scaffold the content. This passive consumption, rather than active adaptation, of digital content highlights a gap in their TCK. This deficiency was compounded by the type of training available, as one teacher pointed out:

Surely, there are enough technical support and training of online teaching in my university, but the training is more about how to use the teaching and learning platform and let us know the basic functions of Apps and platforms. They lacked the integration with the specific subject content such as English teaching. Therefore, it is still a challenge for me to have English class well online. (David)

This statement underscores that current support focuses on TK (how to use the tool) rather than TCK (how to make the tool serve the content). The knowledge of how to storyboard a grammar explanation video, design an interactive exercise that provides meaningful feedback for language learners, or even simply edit an audio clip to isolate a specific linguistic model—all these falls under the domain of TCK and were identified as unmet needs.

The analysis of teacher interviews delineates a landscape of online teaching challenges characterized not by a lack of foundational skills, but by significant difficulties in integrating technological, pedagogical, and content knowledge. The specific challenges within the TPK and TCK domains, as detailed in this chapter, pinpoint

the critical areas where teachers' knowledge integration falls short of the demands of digital instruction.

Discussion

The widespread integration of online teaching into higher education has necessitated a deep understanding of the challenges educators face beyond the initial phase of emergency remote instruction. This qualitative study investigated the persistent obstacles encountered by Chinese university-level EFL teachers in their sustained online practice. The findings suggest that the core challenges are not located in the isolated domains of technology, pedagogy, or content knowledge. Instead, they reside at the critical intersections of these knowledge bases, specifically within the integrative domains of TPK and TCK. This pattern aligns with and lends qualitative support to the foundational principle of the TPACK framework, which posits that meaningful technology integration is a complex act of weaving together different types of knowledge, rather than merely applying them in sequence (Mishra & Koehler, 2006).

Pedagogical Beliefs and the TPK Struggle

While prior research in the Chinese context has effectively identified broad barriers such as inadequate infrastructure or general technostress (Huang et al., 2021), the present analysis offers a more diagnostic perspective. It moves beyond cataloging symptoms to uncover their underlying causes within the teachers' knowledge structure. For instance, the common problem of low student interaction is traced not simply to student disengagement, but to a specific deficit in teachers' TPK. This finding aligns with a growing consensus in the field that the integrative knowledge domains of TPACK are the most significant differentiators between basic and advanced technology use in education (Willermark, 2018).

Beneath these observable TPK challenges often lay a deeper layer of tension related to teachers' pedagogical beliefs and identities. A tendency to revert to teacher-centered instructional modes, despite access to interactive technologies, suggests that the transition to effective online teaching can entail a conceptual shift, not just a technical one. As research in teacher cognition has firmly established, deeply held beliefs about teaching and learning act as powerful filters that shape how teachers perceive and adopt new practices (Borg, 2015). The difficulty in embracing a more facilitative role online can be interpreted as a struggle to reconcile a well-established teacher identity with the demands of a new pedagogical medium. In light of our findings, this conceptual hurdle provides a plausible explanation for the limited long-term impact of professional development that focuses

solely on technical skills, a phenomenon documented in comprehensive reviews of the field (Tondeur et al., 2017). For instance, one teacher's description of their initial resistance hinted at a deep-seated belief in the superiority of traditional methods: "It is the requirement of innovative technology use in English teaching affected my decision. You know, I didn't think it was necessary to adopt online teaching, rather, face-to-face teaching was quite enough to meet the needs of the normal teaching practice" (Emma). This statement suggests that online teaching was initially perceived not as a pedagogically valuable alternative, but as an unnecessary complication of, or inferior substitute for, a traditionally effective practice.

This fundamental belief in the supremacy of teacher-directed, transmissive modes directly manifests in—and exacerbates—the specific TPK challenges identified in this study. For instance, a teacher-centered identity naturally resists designing open-ended, student-led communicative tasks for breakout rooms, as it cedes control and predictable structure. Similarly, the reluctance to move beyond familiar monitoring methods such as reading facial expressions stems partly from a belief that effective teaching requires this direct, physical oversight, thereby inhibiting the exploration of alternative digital means to gauge engagement. Thus, the observed struggles with interactivity and feedback are not merely technical or pedagogical skill deficits but are often behavioral expressions of these deeper epistemological conflicts. Consequently, the widespread frustration over the inability to conduct group activities, as expressed by Ben and Alex, can be re-read not merely as a TPK gap in task design, but also as a symptom of this deeper conflict between their accustomed instructional identity and the facilitative role required by the new medium. The persistence of teacher-centered practices, such as relying solely on controlled question-and-answer sessions (e.g. Ben), underscores that the transition to effective online teaching entails a conceptual shift, not just a technical one.

These deeply-held beliefs directly impacted how teachers approached the practical application of technology in their pedagogy. A prominent theme within the TPK-related challenges was the gap between technical function and pedagogical application. Teachers demonstrated operational competence with tools like breakout rooms but frequently lacked the pedagogical design capacity to create tasks that would facilitate meaningful, sustained communication in the target language. This observation builds upon previous research findings of interactivity as a major hurdle (Dailey-Hebert, 2018; Rugube, 2020). This can be understood as a specific TPK gap concerning the design of communicative language tasks for digital spaces. This aligns with broader calls for a shift in teacher development from "digital literacy" toward "digital

fluency,” where the focus is on creatively designing learning experiences that leverage technology’s unique affordances (Alam & Mohanty, 2023; NOH et al., 2024).

Equally significant was the reported loss of the ability to monitor student comprehension and engagement through non-verbal cues. Teachers described feeling disconnected from their classes, unable to “read the room” and adjust their teaching pace or depth accordingly. This challenge touches upon a sophisticated dimension of TPK that involves formative assessment and relationship-building in a disembodied environment. This can be understood through the lens of “professional vision,” or the skill of “noticing,” which refers to how teachers attend to and interpret classroom interactions (Sherin & van Es, 2005). The online environment demands a recalibration of this skill, requiring teachers to learn new ways of perceiving student thinking and engagement, a challenge that research on online learning communities has also highlighted (Borup et al., 2020). Standard technical training rarely, if ever, addresses this critical component of online teaching competence.

Systemic TCK Challenges in the Digital Ecosystem

The challenges categorized under TCK reveal a systemic misalignment between the available digital ecosystem and the specific epistemological demands of English language teaching within the Chinese context. This misalignment was exacerbated by the top-down, rapid implementation of educational informatization policies, which mandated technology integration without simultaneously ensuring the availability of high-quality, context-specific digital content (Ministry of Education of the People’s Republic of China, 2019). Consequently, a significant investment of teacher time was devoted to the Sisyphean task of sifting through vast but often unsuitable online repositories to find materials that were linguistically accurate, pedagogically scaffolded for Chinese EFL learners, and culturally relevant. This points to a problem of “pedagogical congruence” within the Chinese digital ecosystem, rather than mere scarcity. It underscores the necessity for what Trust (2017) has termed “curation literacy,” a specialized form of TCK involving the critical evaluation, adaptation, and strategic organization of digital content for specific learning goals, which is essential in resource-abundant but quality-variable digital environments.

Furthermore, the need to navigate a fragmented ecosystem of multiple platforms and applications to deliver a single, coherent lesson emerged as a significant systemic barrier. This challenge is acute in the Chinese educational technology landscape, characterized by a plethora of specialized, yet often non-interoperable, platforms such as DingTalk, Chaoxing, and WeChat. This “tool fatigue”

reflects a larger critique of the “platformization” of education (Selwyn et al., 2020). However, our data show its distinct manifestation in China: the prevalent practice of leveraging a suite of separate platforms necessitates that teachers themselves devise and manage the connections between tools, leading to cumbersome workflows and cognitive burden. This fragmentation signifies a deeper TCK challenge that goes beyond knowledge of individual tools. It demands a strategic, systems-thinking ability to construct a streamlined and pedagogically sound digital workflow from a disjointed array of options—a form of knowledge that sits at the intersection of technological understanding and deep content-specific pedagogical logic.

The Core Challenge: Knowledge Synthesis

The analysis of TPK and TCK challenges, stemming from both internal belief systems and external systemic constraints, converges on a central theoretical insight. The distinction between struggling and thriving in the online environment lies not in teachers’ possession of discrete technological or pedagogical skills, but in their capacity for contextualized knowledge synthesis. Mishra and Koehler (2006) theorized TPACK not as the sum of its parts but as a unique form of knowledge emergent from their dynamic interaction. Our findings provide empirical depth to this premise, demonstrating that the integrative components (TPK, TCK) are precisely where practice breaks down. This breakdown reveals that such integration is neither automatic nor purely cognitive.

Instead, the ability to synthesize technology, pedagogy, and content for online language teaching presents itself as a form of practical, situated knowledge. It is a knowledge-in-action that must be negotiated within and against specific contextual forces: the inertia of deeply-held teacher beliefs, the affordances and constraints of a particular digital ecosystem, and the pressures of macro-level policy mandates. The challenges documented in this study are, therefore, more than skill gaps; they are symptoms of the difficulty in generating this situated, integrative knowledge under complex and sometimes contradictory conditions. This view resonates with Porras-Hernández and Salinas-Amescua’s (2013) emphasis on context as constitutive of TPACK, suggesting that what counts as effective integration is fundamentally shaped by the very ecosystems and belief systems that this study has delineated.

Thus, the core challenge unpacked here transcends the Chinese EFL context. It underscores a universal imperative in teacher development for the digital age: moving beyond training in discrete competencies to fostering the adaptive, generative capacity to weave tools, methods,

and content into coherent practice within ever-evolving technological and pedagogical landscapes.

Conclusion, Implications, and Limitations

This study has employed the TPACK framework to move beyond a surface-level listing of online teaching difficulties, providing a diagnostic analysis that traces these challenges to deficits in the integrative knowledge domains of TPK and TCK. Furthermore, by contextualizing these deficits within the interplay of teachers' pedagogical beliefs and the systemic features of the digital ecosystem, the study illuminates the complex, situated nature of knowledge synthesis required for effective online language teaching. The findings lead us to conclude that the core impediments are not a deficiency in isolated technological or pedagogical skills, but rather significant deficits in the integrative knowledge domains of TPK and TCK. Teachers' struggles to design meaningful interactive tasks and to provide effective feedback underscore a TPK gap, reflecting an inability to translate tool functionality into sound pedagogical practice. Concurrently, the considerable challenges in sourcing level-appropriate digital resources and managing fragmented workflows reveal a critical TCK gap, highlighting a systemic misalignment between the available technology and the specific demands of English language teaching. Taken together, these findings point to a core barrier to effective online teaching is a shortfall in the sophisticated, integrative capacity required to weave digital tools seamlessly into the fabric of language education.

The implications of this diagnosis are substantial. Theoretically, this study enriches the TPACK literature by providing compelling qualitative evidence of the framework's power as a diagnostic tool in the Chinese EFL context. It moves abstract knowledge domains into the realm of observable practice, offering a finely-grained account of how TPK and TCK deficits concretely manifest and hinder teaching effectiveness. Practically, these findings necessitate a strategic pivot in teacher professional development (TPD) from generic technical training to sustained, collaborative, and design-oriented learning. TPD initiatives should be structured around the specific TPK and TCK deficits identified in this study. For instance, to address TPK gaps, workshops could focus on "designing and scaffolding meaningful communicative tasks for breakout rooms" or "implementing efficient digital feedback workflows using voice comments and screencasting." To tackle TCK challenges, training sessions could center on "curating and adapting authentic online materials for specific proficiency levels" and "strategically integrating multiple platforms (e.g., DingTalk, Chaoxing) to create coherent lesson workflows for integrated skills teaching." Moving beyond

one-off workshops, establishing professional learning communities where teachers can co-design lessons and critique digital resources would be vital for fostering the necessary knowledge integration. For university administrators and policymakers, it is recommended to support the creation of discipline-specific, level-appropriate digital resource banks. Such institutional initiatives can significantly alleviate the TCK burden on individual teachers, who otherwise spend excessive time searching for suitable materials, and allow them to focus more on pedagogical integration.

This study has certain limitations that should be acknowledged. First, the qualitative data were drawn from a single regional undergraduate university. While this sampling strategy was appropriate for an in-depth phenomenological inquiry and the institution is representative of many universities implementing national informatization policies, it necessarily limits the transferability of the findings. Faculty in top-tier research universities or vocational colleges may have access to different technological resources, institutional support, and student populations, potentially leading to different manifestations of TPACK challenges. Future research should therefore employ large-scale, mixed-methods approaches across diverse institutional contexts to validate and extend these findings. Building directly upon this diagnostic work, a critical next step involves the design and empirical evaluation of targeted intervention programs aimed at fostering the TPK and TCK capacities identified as crucial for success in the digital classroom.

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Ethical Considerations

This study involving human participants was reviewed and approved by the Ethics Committee for Research Involving Human Subjects at the University with protocol number: UPM/TNCPI/RMC/JKEUPM/1.4.18.2 (JKEUPM).

Consent to Participate

Written informed consent was obtained from all participants after they were fully informed of the study's purpose, procedures, rights to withdraw, and potential risks/benefits.

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Data Availability Statement

Data supporting the reported results are available on request.

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Appendix A

Table A1. Semi-Structured Interview Protocol.

Unpacking Chinese EFL teachers' TPACK challenges in online teaching

Time of interview:

Date:

Place:

Interviewee:

Part I. Introduction & Consent

- Welcome and thank the participant
- Research Purpose: "This study aims to understand the specific challenges you face when blending technology with your teaching methods and English language content in online settings."
- Procedures: Explain confidentiality, anonymization procedures, and obtain explicit consent for audio recording.
- Rights: Emphasize voluntary participation and the right to skip any question or withdraw at any time.
- Duration: Estimated time: 60–90 min.

Part II. Background Information of the Participant

- Teaching Years
- Highest Academic Degree
- Academic Rank
- Primary Course Taught
- Typical Class Size
- Main Apps/Teaching Platforms adopted

Part III: Core Questions—TPACK Challenges

A. Technological Pedagogical Knowledge (TPK)—Teaching Methods with Technology

1. How do you typically structure an online lesson compared to a face-to-face class? What specific aspects require completely different approaches?
2. What strategies do you use to encourage active participation and interaction in your online classes? What limitations have you encountered with these strategies?
3. How do you monitor student understanding and engagement during online sessions when visual cues are limited?
4. Could you describe any challenges in providing timely and meaningful feedback to students in the online environment?

B. Technological Content Knowledge (TCK)—Teaching English with Technology

5. How do you select or adapt digital materials for teaching specific English language skills (e.g., speaking, writing, grammar)?
6. What language teaching aspects have proven most difficult to deliver effectively online? Why do you think this is?
7. Can you describe a situation where you struggled to find or create appropriate digital resources for a particular language teaching goal? What was the main gap?

C. Synthesis & Underlying Integration Challenges

8. Looking back at your transition to sustained online teaching, what knowledge or skills do you wish you had developed earlier?
9. Could you share a specific example of an online lesson that did not go as planned? Moving beyond simple technical issues, what would you identify as the primary reasons for the difficulties?
10. What kind of support or training would be most helpful for you right now to address the core challenges we've discussed?

Part IV. Closing

11. Based on our conversation, are there any other challenges in blending technology with your English language teaching that you feel are important but we haven't discussed?

12. Thank you so much for your valuable time and insights. The next step is for me to transcribe and carefully analyze our conversation. Your experiences are crucial for identifying the core challenges in online EFL teaching.

Part V. Interviewer Guidelines:

- Use Probing Questions as needed: "Could you tell me more about that?" "What made that particularly challenging?" "Can you give a specific example?" "How did that affect student learning?"
 - Allow for Silence: Pause after questions to give participants adequate time to reflect and formulate thoughtful responses.
 - Active Observation: Be attentive to non-verbal cues during the interview and note them as relevant to the context.
-

Appendix B

Table B1. Examples of Thematic Analysis Process.

Data excerpt (raw quote)	Initial code	Primary TPACK domain	Final theme
I know how to use the “breakout room” function in DingTalk, but I don’t know how to design a task that truly prompts students to communicate in English. As a result, they just chatted in Chinese inside.	Inability to design meaningful tech-based communicative tasks	TPK	The TPK Gap: Struggling to Translate Technology into Pedagogy
Grading essays online is time-consuming. I have to type long comments into the document; unlike the quick circling and shorthand I can use on paper. I doubt students even read those lengthy text feedback.	Inefficiency and perceived ineffectiveness of digital feedback	TPK	Assessment Hurdles: Inefficiencies in Online Feedback
I spent hours searching for a short video that clearly illustrates the usage of the “present perfect tense” in a real-life context, but most resources were either too simplistic or too advanced for my students.	Struggle to find level-appropriate digital resources for specific language points	TCK	The TCK Challenge: Scarcity of Targeted Digital Materials
In the online classroom, I’ve lost the ability to “read the room.” I can’t see their confused or bored expressions, which makes it very difficult to adjust my teaching pace and depth in real-time.	Lack of non-verbal cues for real-time instructional adjustment	TPK	The Disembodied Classroom: Impeded Monitoring and Feedback
I feel more exhausted teaching listening online. I have to juggle between multiple platforms to upload audio files, subtitles, and exercises, and students often get confused by the process.	Inefficient workflow due to platform fragmentation	TCK	The Tool-Content Mismatch: Cumbersome Workflows for Language Teaching

Note. This table provides representative examples of the data analysis process, illustrating how raw interview transcripts were coded and categorized into themes through the lens of the TPACK framework.