JOURNAL OF CURRENT SOCIAL ISSUES STUDIES Volume 2 Issue 2 , 2025 , 104-115
ISSN (P): 3078-5316 | ISSN (O): 3078-5324 Doi:10.71113/JCSIS.2025v2i2.104-115

The Potential, Challenges, and Pathways of Generative Artificial Intelligence in Empowering the Professional Development of International Chinese Language Teachers

Dan Gou[1*]

[1]*International School of Chinese Studies, Northeast Normal University, Changchun, China*
*Corresponding author: gdan5780@gmail.com

Abstract

Against the backdrop of a sustained surge in global demand for learning Chinese, international Chinese language teachers face severe challenges across multiple dimensions, including cross-cultural teaching, instructional innovation, and resource development. The advent of Generative Artificial Intelligence (generative AI) offers new approaches to address these challenges; however, its value and potential risks in promoting the professional development of international Chinese language teachers have yet to be systematically explored. Drawing upon the Technological Pedagogical Content Knowledge (TPACK) framework, this paper investigates the empowering potential of generative AI for international Chinese language teachers on multiple levels. It also identifies key challenges in practical implementation, such as technological barriers, ethical and cultural sensitivities, and the integration of new technologies into teaching. Through a comprehensive analysis of these issues, the paper proposes a system-level pathway involving technological optimization, teacher capacity building, and pedagogical integration. The aim is to provide an actionable framework and strategies for the wider adoption and deeper integration of generative AI in international Chinese language education. The findings show that only when technology optimization, policy support, and teacher training work in tandem can generative AI effectively drive the professional growth of international Chinese language teachers and foster teaching innovation, thus ultimately contributing to higher-quality and more culturally inclusive sustainable development of Chinese language education worldwide.

Keywords : Generative Artificial Intelligence; TPACK; TCSOL; Professional Development

Suggested citation : Gou, D. (2025). The Potential, Challenges, and Pathways of Generative Artificial Intelligence in Empowering the Professional Development of International Chinese Language Teachers. *Journal of Current Social Issues Studies*, *2*(2), 104–115. https://doi.org/10.71113/JCSIS.2025v2i2.104-115

Introduction

With the continuous advancement of globalization and the growing international influence of China, the global importance of the Chinese language has become increasingly evident. According to the Report on the State of the Chinese Language 2023, the number of people learning Chinese globally has exceeded 30 million, spanning 180 countries and regions; moreover, 81 countries have officially integrated Chinese into their national education systems. Nevertheless, this robust growth in demand is juxtaposed with mounting shortages of international Chinese language teachers and intensifying challenges to their professional development. International Chinese language teachers not only need solid language-teaching skills but also must be adept in cross-cultural instruction, instructional innovation, and the development of teaching resources within highly diverse cultural contexts. Current teacher training systems often fall short of meeting these multifaceted requirements, rendering teacher professional development a critical bottleneck for the sustainable expansion of international Chinese language education.

Meanwhile, the rapid rise of generative AI, exemplified by large language models such as ChatGPT and Claude, has brought about unprecedented technological transformations in the field of education. Thanks to their advanced natural language understanding and text-generation capabilities, these models are steadily being utilized in the design of teaching materials, optimization of

ISSN (P): 3078-5316 | ISSN (O): 3078-5324 **Doi: 10.71113/JCSIS.2025v2i2.104-115**

classroom interactions, and provision of personalized learning support. In the context of international Chinese language education, generative AI can potentially address pressing issues such as heavy lesson-preparation workloads, lack of high-quality teaching resources, and insufficient instructional innovation by offering instant feedback, diverse cultural materials, and cross-linguistic dialog simulations. However, from existing literature, the systematic study of generative AI in promoting the professional development of international Chinese language teachers remains limited, and how exactly it can empower teachers and the possible challenges it brings have not been thoroughly investigated.

At the theoretical level, the multifaceted empowering effect of generative AI on teacher professional development can be analyzed using the TPACK (Technological Pedagogical Content Knowledge) framework. TPACK emphasizes deep interconnections among technology, pedagogy, and content knowledge, providing a logical foundation for integrating emerging educational technologies into cross-cultural language teaching. Specifically, by drawing on large language models, generative AI can create diverse learning materials, design culturally sensitive instructional activities, and support real-time cross-cultural interactions, thereby meeting the multiple demands international Chinese language teachers have for curricular resources and pedagogical innovation. At the same time, technological empowerment can also yield new breakthroughs for teachers in terms of professional development and lifelong learning. In practical terms, generative AI offers opportunities for rethinking career planning, resource optimization, and classroom interaction through an "intelligent generation + personalized support" approach, enhancing the quality and effectiveness of international Chinese language instruction.

In light of these considerations, this study systematically examines the potential and challenges of generative AI in empowering the professional development of international Chinese language teachers and proposes relevant pathways for integration under the TPACK framework. In particular, this paper aims to answer the following key questions: What specific empowering potential does generative AI possess for professional development among international Chinese language teachers, and how can this potential be adapted to the cross-cultural teaching context? What major challenges does generative AI face in aspects such as technological stability, ethical considerations, and pedagogical integration, and what strategies are needed to address these challenges? Under the guidance of the TPACK framework, how can we design a program that deeply integrates technology, pedagogy, and content knowledge to maximize the educational value of generative AI? By analyzing and answering these questions, this paper seeks to fill the research gap at both theoretical and practical levels and to provide a more targeted theoretical and practical foundation for the application and promotion of generative AI in international Chinese language education.

Literature Review

Application and Development of Generative Artificial Intelligence in Education

In recent years, generative AI has gradually become a driving force for innovation in education, largely thanks to breakthroughs in deep learning and natural language processing (Zhai, 2021). Researchers generally agree that, trained on large-scale corpora, generative AI can produce text and multimodal information that is logically coherent, semantically consistent, and diverse, thereby offering new possibilities for teachers and students in resource development, classroom interaction, and learning assessment (Holmes & Tuomi, 2022). In terms of resource development, generative AI can efficiently produce personalized homework assignments, reading materials, and teaching cases, meeting students' diverse needs while significantly reducing the lesson-preparation burden on teachers. As for classroom support, large language models can facilitate real-time generation of natural-language conversational scenarios to enhance students' speaking and interactive skills through simulation. Furthermore, generative AI displays enormous potential in learning assessment and personalized feedback by conducting in-depth analyses of student learning data, enabling real-time monitoring and precise guidance during the teaching process (Chen et al., 2020; Fitria, 2021;

ISSN (P): 3078-5316 | ISSN (O): 3078-5324 **Doi: 10.71113/JCSIS.2025v2i2.104-115**

Limna et al., 2022; Tahiru, 2021; Srinivasa et al., 2022). However, existing research on the role of generative AI in teacher professional development remains relatively sparse, with most studies focusing on student learning outcomes, personalized learning experiences, or broad evaluations of educational technology applications. It is less clear how teachers might harness generative AI for more profound professional development, such as innovations in instructional design, cross-cultural communication, and content-focused professional growth. Meanwhile, challenges such as data bias, cultural fit, and ethical and security concerns can also constrain the sustainable application of generative AI in education (Schiff, 2022; Selwyn, 2022; Holmes et al., 2022; Pedro et al., 2019).

Current Research on the Professional Development of International Chinese Language Teachers

The global expansion of international Chinese language education has made the professional role of Chinese language teachers increasingly complex and multifaceted. Existing studies generally highlight the following three challenges. First, inadequate cross-cultural adaptability. International Chinese language teachers often grapple with diverse cultures, distinct educational systems, and varied academic traditions. Insufficient cultural sensitivity and cross-cultural communication skills can thus undermine teaching effectiveness. Second, a relative weakness in resource development. Given the wide array of student backgrounds and shifting needs, teachers must devote considerable time and effort to the design of teaching materials and lesson plans, yet high-quality and flexible teaching resources remain insufficient. Third, a lack of support systems for professional development. Many international Chinese language teachers do not receive systematic training or ongoing professional guidance, leading to unclear career paths, limited instructional innovation, and underdeveloped career trajectories (Liao et al., 2017; Chen, 2015; Xu, 2012; Yue, 2017). To address these issues, some studies have begun to examine how information technology can help strengthen the professional development of international Chinese language teachers, although these efforts primarily focus on foundational multimedia tools and online teaching platforms (Alsheikhidris, 2020). By contrast, the use of advanced artificial intelligence or generative AI to empower teaching and teacher development—especially in a systematic way—remains relatively underexplored and requires further in-depth investigation.

TPACK Framework and the Integration of Educational Technology

Since its inception, the TPACK framework has garnered widespread attention and empirical validation in the educational technology field. TPACK posits that effective and deep implementation of educational technology requires the intertwined integration of technology (T), pedagogy (P), and content knowledge (CK). Specifically, in a language teaching context, teachers must not only master the technological tools themselves (technological knowledge, TK) but also possess relevant subject expertise (content knowledge, CK) and pedagogical competence (pedagogical knowledge, PK) so that classroom technology use aligns with subject characteristics and student learning processes (Koehler & Mishra, 2005; Angeli & Valanides, 2005; Niess, 2005; Pierson, 2001; Koehler et al., 2012). In international Chinese language instruction, TPACK underscores how technology can facilitate both language input and output in cross-cultural contexts. However, regarding the incorporation of generative AI—an emerging technology—there remains a gap in research on how technology, pedagogy, and content knowledge can operate in synergy and be adapted to the diverse cultural backgrounds of students. Likewise, few studies examine how generative AI can empower deeper professional development dimensions, such as career planning, academic progression, and the cultivation of cross-cultural competencies, under the TPACK lens.

Research on Technology Applications in the Field of International Chinese Language Education

In the broader research on international Chinese language education, early studies primarily explored how multimedia and online platforms assist teachers, improving resource dissemination and remote teaching capabilities. While these approaches have certainly enhanced the accessibility and convenience of instruction, they often overlook their impacts on teachers' deeper professional

ISSN (P): 3078-5316 | ISSN (O): 3078-5324 **Doi: 10.71113/JCSIS.2025v2i2.104-115**

growth (Alsheikhidris, 2020). Digital course materials and intelligent assessment tools have improved teaching efficiency to some extent but lack dynamic adaptation to cross-cultural needs and direct support for teachers' professional expansion (e.g., instructional research and curriculum innovation). With the rise of artificial intelligence, some scholars have begun investigating the potential of AI in language learning, such as AI-based oral error correction and intelligent Q&A systems (Ye, 2024; Yingsoon, 2021). Nevertheless, these applications mainly center on student learning experiences, neglecting the professional growth of teachers—especially international Chinese language teachers. Generative AI, leveraging large-scale language models, can generate more diverse linguistic materials and dialogic scenarios with strong cultural adaptability, thereby providing new avenues for teachers to innovate pedagogically and develop their careers (Cai, 2022). Yet systematic research and empirical validation of aspects such as cultural fit, technological efficacy, and ethical risks remain insufficient.

In summary, extant research tends to focus on student learning outcomes rather than systematically addressing how international Chinese language teachers can leverage generative AI for their professional development. Although numerous studies have validated the TPACK framework in conventional technology-integrated teaching, it is unclear how to achieve a high-level synergy among technology, pedagogy, and content knowledge when a novel technology like generative AI is introduced. Additionally, international Chinese language education must accommodate diverse cultural values and distinct legal environments, calling for more robust assessments of data security, cultural bias, and teaching ethics in generative AI applications. Therefore, this study attempts to examine systematically, through the TPACK lens, how generative AI can empower international Chinese language teachers' professional development, identifying its primary challenges regarding technological limitations, ethical and cultural sensitivity, and pedagogical integration. The paper then proposes specific strategies and pathways grounded in both theory and practice.

The Empowering Potential of Generative Artificial Intelligence for the Professional Development of International Chinese Language Teachers

Knowledge Resources and Content Support

Dynamic Generation of Teaching Materials

International Chinese language instruction often targets diverse cultural and linguistic needs. Traditional teaching materials are not always equipped to address the cultural and regional nuances of each audience. By leveraging large language models, generative AI can rapidly produce teaching materials—covering phonetics, vocabulary, grammar, and cultural scenarios—tailored to different instructional levels and distinct linguistic backgrounds. Drawing on teachers' existing content knowledge (CK), AI can not only dynamically adjust the difficulty and themes of the materials but also significantly reduce lesson-preparation time, offering greater flexibility and customization for learners. This deepens the synergy between technology (T) and content knowledge (CK), thereby extending the scope and adaptability of international Chinese language teaching resources.

Multilingual Comparisons and Cultural Resource Mining

Students from different language and cultural backgrounds often have distinct pain points and common errors in learning Chinese. Generative AI can utilize multilingual corpora and cross-cultural case databases to detect student errors in tones, measure words, and semantic logic, while automatically generating corresponding comparative analyses and instructional suggestions. Additionally, AI can quickly gather and integrate cultural resources, enabling teachers to remain culturally sensitive and up-to-date in cross-cultural teaching. These functions further advance the integration between technology (T) and content knowledge (CK) and have practical value in language instruction.

Real-time Knowledge Updates and Tracking Academic Frontiers

ISSN (P): 3078-5316 | ISSN (O): 3078-5324 **Doi: 10.71113/JCSIS.2025v2i2.104-115**

International Chinese language education spans linguistics, education, sociology, cultural studies, and international relations. By applying natural language processing and related techniques, generative AI can continuously monitor scholarly journals, research reports, and trending social issues, providing teachers with the latest discipline-specific insights and practical examples. Such a content-updating mechanism aids teachers in staying attuned to new developments in the field and incorporating emerging findings into their teaching, thereby facilitating the dynamic interplay of technology and content knowledge (TCK) under the TPACK framework.

Pedagogical Methods and Classroom Innovation

Context-based and Interactive Instructional Design

International Chinese language classes often emphasize real-life simulations and cross-cultural interactions to improve students' communicative skills and cultural awareness. Generative AI can simulate various social or cultural scenarios in a virtual environment, playing multiple roles in dialogues and generating timely feedback. Teachers can integrate these contextual materials directly into lessons to facilitate role-playing, dialog extensions, or group discussions. This deep integration of technology (T) and pedagogy (P) not only enhances immersive learning experiences but also allows teachers to observe and evaluate students' performance from multiple angles, leading to more flexible and effective classroom organization.

Personalized Learning Pathways and Differentiated Guidance

In international Chinese language instruction, learners often exhibit significant differences in their backgrounds and learning needs, making individualized, differentiated instruction a core challenge for teachers. By analyzing real-time classroom data and learner behaviors, generative AI assists teachers in identifying areas where students struggle—such as pronunciation, grammar, or cultural comprehension—and offers targeted exercises and supplementary materials. For example, students with difficulties in spoken Chinese can receive automatically generated pronunciation practice tasks with instant feedback, while those lacking in cultural knowledge can explore in-depth cultural case studies. These personalized strategies align technology (T) with pedagogical (P) requirements, thereby fulfilling the diverse needs of learners.

Instructional Innovation and Action Research

Cross-cultural teaching environments often demand repeated experimentation and flexible adaptations of pedagogical approaches. Generative AI provides extensive quantifiable and analyzable data on classroom interactions, enabling teachers to conduct action research or practice-based research. Teachers can gain immediate insights into error types, participation rates, and cross-cultural comprehension difficulties to refine instructional strategies or devise new teaching methods. Throughout this process, the integration of technology (T) and pedagogy (P) not only strengthens classroom management but also establishes a robust cycle of teaching reflection, helping advance theories and practices of cross-cultural pedagogy.

Teacher Competencies and Cross-cultural Teaching Efficacy

Strengthening Cross-cultural Teaching Competencies

International Chinese language teachers must be proficient in both language instruction and cross-cultural communication. Generative AI can extract common points of cultural conflict or misunderstanding from vast cross-cultural corpora and real-world data, aiding teachers in designing more culturally sensitive and inclusive teaching scenarios. By analyzing and practicing the AI-generated examples, teachers refine their abilities to detect cultural nuances and respond appropriately, thus enhancing the interconnectedness among pedagogy (P), content knowledge (CK), and technology-enabled support to bolster cross-cultural teaching competencies.

Career Planning and Lifelong Learning Mechanisms

ISSN (P): 3078-5316 | ISSN (O): 3078-5324 **Doi: 10.71113/JCSIS.2025v2i2.104-115**

The value of generative AI in teacher professional development extends well beyond resource provision or classroom management. Leveraging data analytics and adaptive technologies, AI can offer personalized career advice based on teachers' research interests, professional goals, and instructional achievements—for example, suggesting relevant conferences, specialized training programs, or international collaboration opportunities. This helps teachers cultivate ecosystems of lifelong learning and continuous improvement. Such processes simultaneously involve technology (T), pedagogy (P), and content knowledge (CK), laying the groundwork for sustained skill updating and expansion.

Refining Instructional Assessment and Reflection

In cross-cultural teaching contexts, assessment and reflection often demand detailed quantitative and qualitative indicators. Generative AI excels in data collection, corpus analysis, and formative evaluation, providing teachers with metrics on classroom interaction, student performance, and error patterns. Incorporating cultural factors, teachers can undertake systematic reflection and adjustments—for instance, by focusing on high-frequency language errors, clarifying cultural nuances, or experimenting with new instructional strategies. In this way, the three knowledge domains (technology, pedagogy, content) are integrated, fueling iterative improvements in teaching quality and overall teacher competencies.

Overall, generative AI offers multifaceted and multidimensional empowerment for international Chinese language teachers. At the TCK level, dynamic content generation, multilingual comparisons, and real-time knowledge updates substantially expand the depth and breadth of teaching resources. At the TPK level, scenario-based simulations, interactive design, and personalized instruction catalyze methodological innovation and increase classroom efficiency. Finally, in PCK and the combined TPACK core, generative AI supports teachers' career development, fosters cross-cultural teaching competencies, and refines assessment and reflection processes, creating a mutually reinforcing cycle between professional development and teaching effectiveness. Nonetheless, realizing these potentials depends on a careful consideration of technological constraints, ethical and cultural sensitivities, and the practical integration of such technologies in real-world teaching environments.

Challenges in Applying Generative Artificial Intelligence

Despite the demonstrated empowering potential of generative AI for the professional development of international Chinese language teachers, real-world implementations still face numerous challenges. These challenges primarily arise in three domains—technological limitations, ethical and cultural sensitivities, and pedagogical integration—and directly affect whether generative AI can be sustainably and effectively utilized in cross-cultural teaching.

Technological Limitations: Quality of Outputs, Cultural Adaptation, and Environmental Constraints

Accuracy and Consistency of Content Generation

Generative AI relies on large-scale training data and deep learning models to produce textual or dialogic content. While this may effectively reduce teachers' lesson-preparation load, the accuracy and consistency of AI outputs remain pressing issues. On the one hand, models may generate misleading or ambiguous content when dealing with advanced grammar or particular cultural references, especially if the training data is inadequate or misaligned with the context. On the other hand, although AI tends to excel at formal linguistic tasks, it may overlook the real-life dynamics of cross-cultural communication. These concerns are especially sensitive in language teaching and can undermine teachers' trust in AI or mislead students about correct language use.

Insufficient Cultural Adaptation

ISSN (P): 3078-5316 | ISSN (O): 3078-5324 **Doi: 10.71113/JCSIS.2025v2i2.104-115**

Beyond linguistic accuracy, cross-cultural teaching contexts place higher demands on cultural competence. If generative AI lacks comprehensive training in the target and native cultures, it may not generate culturally nuanced or appropriately "localized" teaching materials. This shortfall not only leads to superficial content but may also reinforce cultural stereotypes or biases, undermining the inclusivity and authenticity crucial to cross-cultural instruction. In international Chinese language teaching, cultural transmission is vital. If AI-generated content does not adequately capture and convey Chinese cultural cores, it inevitably weakens the holistic achievement of teaching objectives.

Technological Dependence and Environmental Constraints

Generative AI relies heavily on stable network conditions, hardware capabilities, and computational resources. Many schools and educational institutions—particularly in developing countries and remote regions—lack the foundational infrastructure and financial support to deploy AI-based systems. Consequently, large-model computations or real-time AI use face steep barriers, and teaching consistency and quality cannot be guaranteed. Additionally, the costs of model upgrades and maintenance pose ongoing financial and policy challenges for educational administrators, hindering the widespread and in-depth adoption of these technologies.

Ethical and Cultural Sensitivity: Data Bias, Privacy Protection, and Ambiguous Accountability

Potential Impact of Data Bias on Educational Equity

Generative AI is often trained on heterogeneous online data of varying quality, which inevitably contains biases based on gender, ethnicity, or region. Unrecognized or uncorrected, these biases may manifest in the AI-produced language or cultural examples. In cross-cultural education, such biases could distort students' cultural perceptions or reinforce stereotypes, contradicting the foundational goals of international Chinese language education to promote equity, respect for diversity, and global perspectives.

Privacy and Compliance Risks

Generative AI typically requires extensive personal data from students, including learning records and usage logs, in order to deliver personalized teaching and learning analytics. Inadequate data protection mechanisms or regulatory oversight can expose sensitive personal information, facilitating misuse or data leaks. Global or multi-regional international Chinese language programs must also navigate different jurisdictions with varied regulations around data privacy, data sovereignty, and compliance. These complexities exacerbate the difficulty and costs of deploying AI globally. Such privacy concerns also erode the trust of teachers and students, ultimately hindering long-term, large-scale adoption of generative AI in education.

Technological Misuse and Unclear Liability

As AI-generated content becomes more commonplace in the classroom, issues of misuse and blurred responsibility come to the fore. For instance, if teachers overly rely on AI-generated resources without applying professional scrutiny, teaching creativity and quality may be "outsourced" to the technology. When inaccurate or biased information is produced, it remains unclear whether liability rests with the technology provider or the individual user. Such scenarios not only compromise teaching professionalism but also raise legal and ethical disputes that could hamper healthy technological advancement.

Pedagogical Integration: Teacher Acceptance and Alignment with Educational Objectives

Limited Teacher Preparedness for Technology Adoption

The effective application of generative AI in classrooms hinges on teachers' proficiency with AI tools. However, many international Chinese language teachers lack adequate understanding of AI fundamentals, operational nuances, and limitations, impeding their capacity to systematically assess

ISSN (P): 3078-5316 | ISSN (O): 3078-5324 **Doi: 10.71113/JCSIS.2025v2i2.104-115**

or adapt AI outputs. This skill gap lowers confidence in adopting new technologies and may lead to misapplications that waste resources or even negatively affect student learning.

Complexity in Adjusting Pedagogical Strategies

International Chinese language teachers must simultaneously address linguistic and cultural goals. While generative AI can theoretically expand teaching materials and provide personalized resources, teachers still need to review, select, and adapt AI outputs to ensure consistency and relevance. Without a cohesive plan for how technology intersects with pedagogical practices, teachers might struggle to balance traditional and AI-based approaches or fail to respond adequately to real student needs.

Potential Misalignment between Technology and Educational Goals

Generative AI often emphasizes linguistic form and automated content production, whereas effective language teaching focuses on communicative practice and cultural exploration. If AI outputs concentrate excessively on grammar rules without adequately highlighting the cultural context or communicative purpose, they may contradict key objectives of international Chinese language education. Should teachers fail to culturally or pedagogically contextualize AI-generated materials, learners might exhibit some linguistic gains but miss the deeper cross-cultural competencies that language education aims to cultivate.

In sum, generative AI's application to cross-cultural teaching and teacher development still faces a triad of challenges. Technologically, output accuracy and cultural sensitivity are not fully assured, and infrastructural disparities impede widespread adoption. Ethically and culturally, data bias, privacy, and liability issues pose significant threats to educational equity and raise social risks. Pedagogically, limited teacher expertise and difficulties aligning with educational goals can compromise or even reverse potential benefits. Therefore, effectively implementing generative AI in international Chinese language education requires improvements in technical design, policy frameworks, and teacher training, ensuring that emerging technologies truly serve the goal of high-quality education and meaningful professional development.

Exploring Pathways for Generative Artificial Intelligence Empowerment

Having clarified the potential benefits and barriers to applying generative AI in the professional development of international Chinese language teachers, the question now turns to how best to realize these benefits in pedagogical practice. Guided by the TPACK framework, this paper offers a three-pronged approach—focusing on technological optimization, teacher capacity building, and instructional integration—to illustrate how generative AI can be holistically incorporated into pedagogy (P) and content knowledge (CK) for high-quality education in international Chinese language contexts.

Technological Optimization

Under TPACK, the alignment of technology (T) with content knowledge (CK) (i.e., TCK) ensures that technological tools precisely address subject-specific needs. For generative AI, optimizing data resources and algorithmic design to suit cross-cultural and multilingual contexts is essential to fully realize its capabilities.

Building a High-Quality, Diverse Corpus

Building high-quality, diverse language databases lays the groundwork for TCK integration. International Chinese language instruction spans students of various linguistic backgrounds, necessitating large volumes of annotated multilingual and cross-cultural data—text, audio, and video—so that AI can better detect and generate culturally relevant materials. For instance, a "cross-cultural corpus" could be established to collect typical errors or cultural conflicts that

ISSN (P): 3078-5316 | ISSN (O): 3078-5324 **Doi: 10.71113/JCSIS.2025v2i2.104-115**

students commonly face, aligned with specific teaching objectives and language levels. This resource would give teachers greater flexibility and precision in selecting instructional materials.

Integrating Educational Context into Model Design

Educational context modules should be integrated into AI algorithms and models. Using few-shot learning and reinforcement learning, for example, the model can incorporate dynamic assessments of cultural sensitivity and linguistic coherence. Such design ensures that generative AI pays attention not only to "language accuracy" but also to "cultural appropriateness," thereby advancing beyond mere resource provisioning to more intelligent support and adaptive corrections for educational needs.

Refining Technological Deployment and Use Environments

In view of the realities of international Chinese language programs, which may be dispersed geographically and operate under varying network conditions, a hybrid deployment strategy (cloud plus on-premise) might be optimal. This approach allows teachers to leverage the cloud's high computational power and large-scale models while retaining critical functionalities locally in low-bandwidth environments. Additionally, robust data privacy and security measures should be put in place to minimize teachers' and students' concerns about personal data breaches, thereby fostering broader acceptance of AI technology.

Teacher Capacity Building

Teachers are central to any instructional activity; effective use of generative AI hinges on the synergy of technology (T), pedagogy (P), and content knowledge (CK). Thus, capacity-building initiatives must address both technological literacy and pedagogical integration, while strengthening cross-cultural and subject-specific competencies (PCK).

Systematic Technology Training: From Conceptual Awareness to Practical Mastery

In the TPK (technology-pedagogy) dimension, teachers must have foundational knowledge of how large language models work, the core functionalities they provide, and the limits and inherent biases they may carry. Workshops, case-based discussions, or micro-teaching sessions can help teachers practice the integration of AI in curriculum resource generation, interactive activities, and data-driven feedback, honing their ability to embed technology meaningfully into instructional design.

Cross-cultural Teaching Proficiency and Subject Knowledge

In international Chinese language contexts, improving teaching methods (P) and content knowledge (CK) remains crucial. Generative AI can comb through immense cross-cultural data to highlight common misconceptions or intercultural tensions, helping teachers develop a nuanced understanding of diverse cultural contexts. Only with a robust background in linguistics and cross-cultural communication can teachers effectively modify AI outputs to address classroom realities, including potential cultural misunderstandings or contextual gaps.

Action Research and Ongoing Reflection: Toward a Dynamic TPACK Cycle

TPACK holds that teacher professional growth is iterative. By leveraging real-time assessment and analytics from generative AI, teachers can conduct small-scale action research to examine the effects of various pedagogical methods and technological solutions on students' learning outcomes and classroom engagement. Feedback loops from empirical data and reflective practice help refine instructional approaches. Meanwhile, forming teacher communities or cross-institutional workshops encourages the rapid exchange of experiences and strategies for effectively blending technology and pedagogy, creating an ecosystem of continuous professional development.

Pedagogical Integration: Operationalizing the Core of TPACK

ISSN (P): 3078-5316 | ISSN (O): 3078-5324 **Doi: 10.71113/JCSIS.2025v2i2.104-115**

When technology (T), pedagogy (P), and content (CK) merge in real classroom practice, the heart of the TPACK framework is activated. For generative AI to truly empower teachers' professional development and enhance learning effectiveness, systematic pedagogical integration is essential.

Contextualized, Interactive Instructional Design

Generative AI provides a transformative edge in simulating contextual and social interactions thanks to its robust language modeling and real-time feedback features. Teachers can use AI to create cross-cultural dialogs or role-play activities, immersing students in realistic communicative settings that sharpen both language proficiency and cultural insights. By capturing students' difficulties related to "cultural sensitivities" or "language errors," teachers can adjust future lesson plans, thereby increasing student engagement and deepening cultural learning.

Personalized Instructional Delivery

Generative AI can analyze student assignments, quizzes, and classroom performances to identify linguistic and cultural difficulties among different learner groups. In response, teachers can implement differentiated instruction—providing specialized pronunciation exercises for those struggling with speaking, for example, or offering additional cultural readings for those less familiar with Chinese contexts. Such precise support enables more efficient class management by reducing repetitive tasks and allowing teachers to focus on fostering creativity and deeper learner interactions.

Formative Assessments and Cross-cultural Feedback

Generative AI can also serve as a "process monitor" and "cross-cultural feedback agent" in assessment. Unlike traditional post-hoc assessment approaches, AI can capture and analyze students' language outputs, cultural understandings, and even group collaboration in real time, creating a "learning trajectory" visualization. Teachers thus gain a more detailed grasp of learners' progress and bottlenecks. Through natural language processing, AI can offer more nuanced and timely suggestions for cross-cultural communication, providing targeted strategies for improvement.

In summary, for generative AI to serve as a sustainable and profound driving force in the professional development of international Chinese language teachers, a closed-loop system is needed along three dimensions—technological optimization (deep TCK alignment), teacher capacity building (reinforcing TPK and PCK), and pedagogical integration (operationalizing the TPACK core). At the technological level, high-quality corpora and advanced algorithms attuned to cross-cultural, multilingual demands are paramount. On the teacher side, systematic training in both technology application and cross-cultural pedagogy is vital to harness these new tools effectively. Finally, in the classroom, contextualized design, personalized teaching, and process-oriented evaluations infuse technology seamlessly into teaching, revitalizing language and culture education with greater depth and dynamism. Only through such integrated efforts can generative AI evolve from a mere tool into a sustained catalyst for innovation in international Chinese language teaching and a facilitator of teachers' professional growth, propelling global Chinese language education toward higher quality and greater cultural inclusivity.

Conclusion

As the global demand for international Chinese language education expands, teachers increasingly grapple with cross-cultural adaptation, instructional innovation, and professional advancement. This paper draws upon the TPACK framework to systematically explore how generative AI can empower the professional development of international Chinese language teachers. We also analyze the technology-related, ethical, and pedagogical challenges that may arise and propose a multidimensional pathway centered on technological optimization, teacher capacity building, and pedagogical integration. Overall, our findings suggest that large language models, the core driving force in generative AI, can substantially support international Chinese language teachers by generating cross-linguistic resources, simulating cultural scenarios, delivering real-time

ISSN (P): 3078-5316 | ISSN (O): 3078-5324 **Doi: 10.71113/JCSIS.2025v2i2.104-115**

evaluations, and informing teachers' career planning. However, the effectiveness of such interventions depends on carefully balancing technological limitations, ethical sensitivities, and real-world teaching conditions.

By applying the TPACK framework to generative AI's role in international Chinese language education, this study extends existing perspectives on the interplay between educational technology and cross-cultural instruction. It also provides a theoretical reference point for future inquiries into how large language models interact with teacher development. By closely integrating the distinctive features of generative AI—such as natural language generation and personalized recommendations—with practical language teaching needs, this paper heeds the call for more fine-grained theories on technology integration in education. In terms of practical implications, our conclusions provide guidance for resource allocation, teacher training, and technological deployment in international Chinese language institutions and among policymakers. For practicing teachers, the proposed approaches to technical optimization and action research offer concrete strategies to harness new technology tools for interactive cross-cultural teaching and continuous professional growth. For AI developers and educational platform providers, the analysis of cultural needs, data security, and teacher development requirements outlined here can inform the refinement of AI functionalities and service models tailored to international Chinese language education.

Funding

This research did not receive any funding from institutions or individuals.

Conflict of Interest

The author(s) declare no conflicts of interest.

References

[1] Alsheikhidris, M. A. A. (2020). Challenges for moving Chinese language courses online. *Educat ion and quarterly reviews, 3*(3). https://ssrn.com/abstract=3649392

[2] Angeli, C., & Valanides, N. (2005). Preservice elementary teachers as information and communi cation technology designers: An instructional systems design model based on an expanded view of pedagogical content knowledge. *Journal of computer assisted learning, 21*(4), 292-302. http s://doi.org/10.1111/j.1365-2729.2005.00135.x

[3] Cai, Q. Y. W. (2022). Creating and applying Artificial Intelligence teaching materials for online courses: Review of student teacher skills when teaching Chinese as a foreign language. *Chinese Language Teaching Methodology and Technology, 5*(1), 47. https://engagedscholarship.csuohio. edu/cltmt/vol5/iss1/4

[4] Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. *Ieee Access, 8*, 75264-75278. https://doi.org/10.1109/ACCESS.2020.2988510

[5] Chen, Z. (2015). Challenges of teaching Chinese in Australian schools: Lesson from beginning t eacher-researchers. *Journal of Language Teaching and Research,* 933-942. https://doi.org/10.17 507/jltr.0605.04

[6] Fitria, T. N. (2021). Artificial intelligence (AI) in education: Using AI tools for teaching and lea rning process. *In Prosiding Seminar Nasional & Call for Paper STIE AAS* (Vol. 4, No. 1, pp. 13 4-147). https://prosiding.stie-aas.ac.id/index.php/prosenas/article/view/106

[7] Holmes, W., & Tuomi, I. (2022). State of the art and practice in AI in education. *European Jour nal of Education, 57*(4), 542-570. https://doi.org/10.1111/ejed.12533

[8] Holmes, W., Porayska-Pomsta, K., Holstein, K., Sutherland, E., Baker, T., Shum, S. B., ... & Ko edinger, K. R. (2022). Ethics of AI in education: Towards a community-wide framework. *Intern ational Journal of Artificial Intelligence in Education,* 1-23. https://doi.org/10.1007/s40593-021 -00239-1

[9] Koehler, M. J., & Mishra, P. (2005). What happens when teachers design educational technolog y? The development of technological pedagogical content knowledge. *Journal of educational co*

mputing research, 32(2), 131-152. https://doi.org/10.2190/0EW7-01WB-BKHL-QDYV

[10] Koehler, M. J., Shin, T. S., & Mishra, P. (2012). How do we measure TPACK? Let me count t he ways. *In Educational technology, teacher knowledge, and classroom impact: A research han dbook on frameworks and approaches* (pp. 16-31). IGI Global. https://doi.org/10.4018/978-1-60 960-750-0.ch002

[11] Liao, W., Yuan, R., & Zhang, H. (2017). Chinese language teachers' challenges in teaching in US public schools: A dynamic portrayal. *The Asia-Pacific Education Researcher, 26*, 369-381. https://doi.org/10.1007/s40299-017-0356-z

[12] Limna, P., Jakwatanatham, S., Siripipattanakul, S., Kaewpuang, P., & Sriboonruang, P. (2022). A review of artificial intelligence (AI) in education during the digital era. *Advance Knowledge f or Executives, 1*(1), 1-9. https://ssrn.com/abstract=4160798

[13] Niess, M. L. (2005). Preparing teachers to teach science and mathematics with technology: De veloping a technology pedagogical content knowledge. *Teaching and teacher education, 21*(5), 509-523. https://doi.org/10.1016/j.tate.2005.03.006

[14] Pedro, F., Subosa, M., Rivas, A., & Valverde, P. (2019). *Artificial intelligence in education: C hallenges and opportunities for sustainable development.* https://hdl.handle.net/20.500.12799/6 533

[15] Pierson, M. E. (2001). Technology integration practice as a function of pedagogical expertise. *Journal of research on computing in education, 33*(4), 413-430. https://doi.org/10.1080/088865 04.2001.10782325

[16] Schiff, D. (2022). Education for AI, not AI for education: The role of education and ethics in n ational AI policy strategies. *International Journal of Artificial Intelligence in Education, 32*(3), 527-563. https://doi.org/10.1007/s40593-021-00270-2

[17] Selwyn, N. (2022). The future of AI and education: Some cautionary notes. *European Journal of Education, 57*(4), 620-631. https://doi.org/10.1111/ejed.12532

[18] Srinivasa, K. G., Kurni, M., & Saritha, K. (2022). Harnessing the Power of AI to Education. *In Learning, teaching, and assessment methods for contemporary learners: pedagogy for the digit al generation* (pp. 311-342). Singapore: Springer Nature Singapore. https://doi.org/10.1007/978 -981-19-6734-4_13

[19] Tahiru, F. (2021). AI in education: A systematic literature review. *Journal of Cases on Informa tion Technology (JCIT), 23*(1), 1-20. https://doi.org/10.4018/JCIT.2021010101

[20] Xu, H. (2012). *Challenges native Chinese teachers face in teaching Chinese as a foreign langu age to non-native Chinese students in US classrooms.* https://digitalcommons.unl.edu/teachlearn student/20/

[21] Ye, H. (2024). *Effectiveness of ChatGPT-assisted oral corrective feedback for international Ch inese language teachers* (Master's thesis, Nanjing University of Information Science and Techn ology). https://link.cnki.net/doi/10.27248/d.cnki.gnjqc.2024.001699

[22] Yingsoon, G. Y. (2021). Using AI Technology to Support Speaking Skill Development for the Teaching of Chinese as a Foreign Language. *In Multidisciplinary Functions of Blockchain Tech nology in AI and IoT Applications* (pp. 209-227). IGI Global. https://doi.org/10.4018/978-1-799 8-5876-8.ch010

[23] Yue, Y. (2017). Teaching Chinese in K–12 schools in the United States: What are the challeng es?. *Foreign Language Annals, 50*(3), 601-620. https://doi.org/10.1111/flan.12277

[24] Zhai, X., Chu, X., Chai, C. S., Jong, M. S. Y., Istenic, A., Spector, M., ... & Li, Y. (2021). A R eview of Artificial Intelligence (AI) in Education from 2010 to 2020. *Complexity, 2021*(1), 8812 542. https://doi.org/10.1155/2021/8812542