

ChatGPT and International Chinese Language Education: A Bibliometric and Content Analysis Based on CiteSpace



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Abstract: The emergence of generative artificial intelligence, represented by ChatGPT, has created new opportunities for the development of International Chinese Language Education (ICLE), while simultaneously posing significant challenges to traditional teaching models, teacher roles, and learning assessment systems. Over the past two years, Chinese scholars have conducted multidimensional research on the application value, potential risks, and response strategies of ChatGPT in ICLE, producing a body of representative academic fruit. Taking 17 relevant studies published in China over the past two years as the research corpus, this study integrates qualitative content analysis with bibliometric analysis using CiteSpace to systematically examine the thematic structure, research hotspots, and developmental trends of ChatGPT-related ICLE research. The findings indicate that existing studies mainly focus on pedagogical applications, teacher role transformation, educational technology ethics, and language quality assessment. Overall, the field demonstrates a developmental trajectory from macro-level discussions toward more concrete pedagogical and empirical investigations. However, limitations remain in terms of empirical depth, theoretical integration, and the construction of evaluation frameworks. Based on these findings, this paper proposes directions for future research, aiming to provide references for the high-quality development of ICLE in the context of generative artificial intelligence.

Keywords: ChatGPT; Generative Artificial Intelligence; International Chinese Language Education; CiteSpace

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1 Introduction

The rapid advancement of AI technologies is profoundly reshaping the educational landscape. In particular, generative AI represented by ChatGPT has attracted widespread attention in the field of language education due to its powerful capabilities in natural language generation and interaction [7]. Unlike traditional computer-assisted language learning tools that are primarily rule-based or task-oriented, ChatGPT can generate coherent texts, engage in multi-turn dialogue, and provide immediate feedback, making its ped-

agogical potential in language teaching especially prominent [13].

As an emerging discipline that integrates language instruction, cultural communication, and national strategic considerations, International Chinese Language Education (ICLE) is highly sensitive to technological interventions. On the one hand, the advent of ChatGPT offers new possibilities for alleviating the global shortage of Chinese language teachers, expanding instructional scenarios, and supporting personalized learning. On the other hand, it has

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triggered extensive discussions regarding issues such as the weakening of teacher roles, learner dependency, academic integrity, and educational ethics [14, 15]. Within a relatively short period, Chinese scholars have conducted intensive research on these issues, resulting in a body of studies characterized by thematic diversity and interdisciplinary perspectives.

Against this background, it is necessary to conduct a systematic review of existing research. Such a review should not only synthesize research findings at the content level but also employ bibliometric tools to capture the overall research structure and developmental trends. Accordingly, this study introduces CiteSpace-based knowledge mapping analysis in combination with traditional literature analysis to provide a comprehensive examination of ChatGPT-related research in ICLE.

2 Literature Review

2.1 Studies on the Overall Impact of ChatGPT on ICLE

The emergence of ChatGPT has provided new momentum for the digital and intelligent transformation of ICLE. Scholars have noted that generative AI, with its strong language generation and interaction capabilities, can expand instructional formats and learning scenarios, partially alleviate the uneven global distribution of Chinese language teachers, and improve the efficiency of instructional resource provision [4, 14]. By supporting personalized learning paths and real-time feedback mechanisms, ChatGPT offers more flexible learning support conditions and provides technological backing for the transition of ICLE from digitalization to intelligentization.

However, the impact of ChatGPT on ICLE is not limited to technological empowerment; it is accompanied by a series of potential risks and challenges. Previous studies have pointed out that generative AI is not value-neutral. Uncertainties regarding ideological orientation, cultural positioning, and knowledge accuracy in AI-generated content may negatively affect the educational goals and cultural communication functions of ICLE if not properly guided [15]. Furthermore, the widespread application of ChatGPT in teaching has raised concerns related to academic integrity, learner dependency, and educational ethics, prompting scholars to re-examine the boundaries and principles governing AI intervention in ICLE [11].

Overall, this line of research provides a crucial macro-level perspective on the impact of ChatGPT on the ICLE landscape and lays a value-oriented foundation for subsequent pedagogical application studies.

2.2 Studies on Pedagogical Applications of ChatGPT

Pedagogical application studies of ChatGPT in ICLE have predominantly focused on writing instruction, a tendency closely related to the high dependence of writing tasks on language generation and feedback. Numerous studies indicate that ChatGPT can play a supportive role at different stages of writing instruction, particularly in idea generation, text modeling, language polishing, and feedback provision [1, 2, 9].

During the pre-writing stage, ChatGPT can offer topic suggestions and structural frameworks to help learners clarify their writing direction. In the drafting process, learners may use ChatGPT for sentence reformulation and language optimization, thereby alleviating difficulties associated with limited expression or writer's block. In the post-writing stage, ChatGPT can function as a preliminary feedback tool, assisting learners in identifying linguistic shortcomings and improving revision efficiency.

Existing studies generally agree that the appropriate use of ChatGPT can reduce the cognitive load associated with writing tasks, enhance writing fluency and linguistic accuracy, and improve teachers' efficiency in lesson preparation and essay grading [1, 6, 9]. Consequently, some researchers view ChatGPT as a pedagogically valuable auxiliary tool in writing instruction, highlighting its potential in supporting personalized and autonomous learning [1, 6].

Nevertheless, scholars remain cautious regarding the risks associated with ChatGPT's instructional use. It has been noted that without clear instructional design and usage boundaries, learners may develop excessive dependence on ChatGPT, thereby diminishing opportunities for independent thinking, language production, and cognitive development, which may negatively affect long-term language proficiency [8]. Additionally, some studies point out limitations in ChatGPT's cultural expression and discourse depth. AI-generated texts often exhibit formulaic patterns, which, if directly adopted as learning models, may constrain learners' expressive styles and cognitive development [3, 10].

Accordingly, researchers emphasize the guiding and regulatory role of teachers in ChatGPT use, advocating for its

integration into systematic instructional design with clearly defined functions and purposes, rather than treating it as a substitute for teaching. While affirming ChatGPT's auxiliary value in writing instruction, existing studies also reflect critically on its potential risks, offering important insights for future applications across a broader range of language skills.

2.3 Studies on Teacher Roles and Teacher Education

The emergence of ChatGPT has not diminished teachers' central role in education; instead, it has imposed higher demands on teachers' professional competence and role positioning. In the context of widespread generative AI integration, teachers are transitioning from traditional knowledge transmitters to learning designers, facilitators, and value arbiters [5, 16].

Teachers are required to systematically plan the use of ChatGPT at the instructional design level, clearly defining its functional positioning within the teaching process and guiding learners to use AI tools appropriately at suitable instructional stages. Moreover, teachers must assume responsibility for regulating technology use and preventing academic misconduct, fostering learners' critical awareness of generative AI rather than allowing it to be perceived as a simple replacement tool [15].

Given the strong cultural orientation and value implications of ICLE, teachers' roles in cultural explanation, value guidance, and intercultural communication remain irreplaceable. In the context of generative AI, teachers are not only facilitators of linguistic knowledge but also interpreters of cultural meaning and gatekeepers of educational values. Therefore, AI literacy should be systematically incorporated into ICLE teacher education programs. Enhancing teachers' understanding of generative AI principles, application boundaries, and ethical issues can strengthen their professional judgment in intelligent instructional environments. Collectively, these studies provide important insights into talent development for ICLE in the era of generative AI.

2.4 Empirical Studies on the Quality of ChatGPT-Generated Texts

Although relatively few in number, empirical studies ex-

amining the linguistic characteristics of ChatGPT-generated texts play an important complementary role in the current research framework. Such studies typically compare texts produced by ChatGPT, Chinese as a second language learners, and native Chinese speakers in terms of writing quality, lexical complexity, and overall language performance, thereby exploring the boundaries of generative AI's linguistic capabilities from a linguistic perspective [3].

Findings indicate that ChatGPT-generated Chinese texts can approach native-speaker levels in overall writing scores, demonstrating high linguistic accuracy, structural completeness, low grammatical error rates, and strong textual coherence. These results objectively confirm the technological advantages of generative AI in language production and help explain its high application potential in ICLE writing instruction.

However, deficiencies remain in terms of lexical diversity, expressive depth, and emotional authenticity. ChatGPT-generated texts show limitations in advanced vocabulary use and semantic variation, tend toward formulaic expression, and lack personalized style and genuine emotional experience. While generative AI excels in formal language production, it remains inferior to human learners in deeper pragmatic competence and cultural expression [3].

These empirical findings provide linguistic evidence for appropriately delineating ChatGPT's functional boundaries in ICLE and empirically support the principle of "assistance rather than substitution." By revealing both strengths and limitations of generative AI language capabilities, such studies offer a scientific basis for teachers' rational and informed use of ChatGPT in instructional practice.

3 Research Methods

3.1 Data Sources

This study selects 17 research articles related to ChatGPT and ICLE published in China over the past two years as the analytical sample. The literature was retrieved from major Chinese academic journal databases, with publication dates concentrated in the early stage following the introduction of ChatGPT into the educational field. As such, the dataset demonstrates strong contemporaneity and stage representativeness.

All selected studies take ChatGPT or generative AI as their core research focus, explicitly situating their inquiry

within the field of ICLE. The research topics encompass theoretical discussions, pedagogical applications, teacher development, and empirical language analyses. In terms of research types, the corpus includes macro-level policy interpretation and strategic studies, classroom-based application research, thematic investigations into teacher roles and professional development, as well as empirical comparative studies based on linguistic data. Collectively, these studies reflect the primary concerns and research orientations of Chinese academia regarding the empowerment of ICLE through ChatGPT [2, 4].

Although the number of sampled articles is relatively limited, given the short time span since the emergence of ChatGPT-related research, the dataset remains sufficiently representative to support an analysis of the field's research structure and developmental trends.

3.2 Research Methods

This study adopts a mixed-methods approach that integrates qualitative content analysis with bibliometric analysis to achieve a dual examination of research content and research structure.

At the qualitative level, all selected articles were systematically read and manually coded, with particular attention paid to research themes, research objects, methodologies, and major findings. Through repeated comparison and categorization, the primary thematic types and focal concerns of ChatGPT-related ICLE research were identified, providing a foundation for subsequent analysis.

At the bibliometric level, CiteSpace was employed to conduct visualization analyses, focusing on keyword co-occurrence and clustering to reveal research hotspots, thematic structures, and evolutionary characteristics of the field [2]. In CiteSpace, the time span was set from 2023 to 2025, with a time slice of two years. “Keywords” were selected as the node type to ensure stability and interpretability of the results despite the relatively small sample size. Analysis of the keyword co-occurrence network and clustering results enables a macro-level presentation of the overall knowledge structure and thematic distribution of ChatGPT-related ICLE research.

By combining qualitative content analysis with CiteSpace-based bibliometric analysis, this study not only provides an in-depth interpretation of research perspectives at the textual level but also captures the overall research landscape and developmental trajectory at the structural level, thereby enhancing the systematicity and objectivity of the review.

4 Results

As shown in Figure 1, “artificial intelligence” occupies a central position in the keyword co-occurrence network, with a large node size and dense connections to multiple keywords, indicating its hub status in current research. This suggests that existing studies are primarily organized around generative AI, with discussions centering on the integration of AI technologies into ICLE as a core research concern.



Figure 1 Keyword Co-occurrence Network

Closely associated with the central keyword “artificial intelligence” are terms such as “Chinese language teaching” and “Chinese language learning,” reflecting the strong pedagogical and learning-oriented focus of the research. Rather than concentrating on AI technologies itself, scholars tend to examine their concrete applications in ICLE contexts, exploring how AI influences instructional design, classroom activities, and learners’ language acquisition processes. This indicates a research orientation that prioritizes pedagogical practice and learning outcomes, emphasizing technology as a means to serve language teaching and learning objectives.

Additionally, keywords such as “interaction” and “activity theory” form notable associative structures with “artificial intelligence,” “Chinese language teaching,” and “Chinese language learning.” This suggests that some studies have begun to incorporate theories from language education and second language acquisition to explain interaction mechanisms and learning activities in AI-mediated instructional contexts. Such developments indicate a shift from early-stage discussions of technological functions toward

more theoretically informed analyses of teaching processes and learning mechanisms.

At the same time, the presence of application-oriented keywords such as “countermeasures” reflects a growing concern with normative use and practical pathways. While examining instructional effectiveness, researchers are increasingly extending their focus to principles and strategies for the appropriate use of AI in ICLE. Overall, the keyword co-occurrence network reveals a research structure centered on AI, grounded in Chinese language teaching and learning, and gradually incorporating theoretical perspectives and practical strategies. This pattern reflects a developmental trend from technological introduction to pedagogical practice, followed by theoretical reflection and normative application.

5 Discussion

Integrating the results of content analysis and CiteSpace visualization reveals that although Chinese academia has conducted relatively concentrated and multidimensional research on ChatGPT and ICLE in recent years, the field as a whole remains in an early developmental stage, with notable limitations in research depth and systematic framework construction.

From a methodological perspective, empirical studies remain limited in number and are often characterized by small sample sizes and short research durations. Research contexts and participant profiles are relatively homogeneous, with many studies confined to single instructional tasks or skill areas. The lack of longitudinal empirical evidence tracking learners’ language development restricts the generalizability and explanatory power of existing findings.

At the pedagogical application level, some studies remain largely descriptive, focusing on instructional experience summaries and reflective practice, with insufficient integration of second language acquisition theories, cognitive linguistics, or educational technology theories. Although valuable explorations of ChatGPT’s role in writing instruction have been conducted, theoretical explanation and mechanism analysis remain underdeveloped, and a systematic theoretical framework has yet to emerge [7].

From an evaluative perspective, limited attention has been paid to assessment systems in the context of generative AI. How to reconstruct process-oriented and outcome-based assessment criteria under conditions of widespread AI involvement, and how to distinguish learners’ authentic

language ability from AI-assisted performance, remain unresolved issues requiring urgent scholarly attention.

Future research may be advanced in the following directions:

- (1) Longitudinal empirical studies with expanded sample sizes and extended research period should be conducted to systematically examine the long-term impact of ChatGPT on learners at different proficiency levels and with diverse learning objectives.
- (2) Greater emphasis should be placed on theoretical model construction by integrating second language acquisition theories, educational technology frameworks, and learning analytics to explore instructional and assessment models supported by generative AI.
- (3) Interdisciplinary research should be strengthened to promote deeper integration among linguistics, educational technology, artificial intelligence, and ICLE, enabling a comprehensive examination of the mechanisms and pathways through which generative AI empowers ICLE.

6 Conclusions

The rapid development of generative artificial intelligence has introduced new technological conditions and opportunities for International Chinese Language Education. Existing research has explored the potential pathways and practical impacts of ChatGPT’s integration into ICLE from multiple perspectives, including macro-level influence, pedagogical practice, teacher roles, and empirical language analysis, providing an important foundation for understanding the field’s current status and developmental trends.

Overall, ChatGPT demonstrates clear advantages in language generation, interactive feedback, and learning support, offering practical possibilities for improving instructional resource efficiency, supporting personalized and autonomous learning, and advancing the intelligent transformation of ICLE. However, its educational value is highly dependent on teachers’ professional guidance and instructional design. The integration of generative AI does not alter the fundamentally human-centered nature of education, nor can it replace teachers’ core roles in instructional regulation, value guidance, and cultural communication [12, 17].

ChatGPT should be positioned as an auxiliary tool serving pedagogical practice, operating under dual constraints of institutional regulation and instructional design. Clear usage boundaries and normative application scenarios are

essential to prevent risks such as learner dependency, academic misconduct, and value deviation. At the same time, the potential of generative AI to support instructional innovation and learning facilitation should be fully explored to better serve the educational objectives of ICLE.

Under conditions of rational guidance and regulated use, generative artificial intelligence holds promise for empowering the high-quality development of International Chinese Language Education without undermining educational agency. As research deepens and practical experience accumulates, achieving effective integration of technology and education while upholding human-centered and culture-oriented principles will remain a central issue for both ICLE research and practice.

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