

A CiteSpace-based Visualization Analysis of Research Trends and Future Directions in AI-enabled Middle School English Language Teaching in China

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Abstract

Against the backdrop of the national strategy for educational digitalization, the integration of artificial intelligence (AI) with English language teaching (ELT) has become a significant driver of educational transformation. Using CiteSpace as a visualization tool, this study conducted a systematic analysis of journal articles indexed in the China National Knowledge Infrastructure (CNKI) database from 2013 to 2025. The findings reveal that this field is experiencing rapid development, with current core research directions focusing on personalized learning path design, immersive language environment construction, and data-driven intelligent teaching evaluation. The application of generative AI models—such as intelligent writing evaluation systems and AI conversational partners—is profoundly reshaping teaching models and methodologies. However, the study also identifies several challenges: a limited volume of high-quality studies, a lack of methodological diversity, and insufficient coverage of research subjects. Looking ahead, future research should emphasize a teaching transformation orientation, deepen the practical application of big data in specific instructional scenarios, and strive to build a human-AI collaborative teaching ecology to address challenges related to semantic understanding, data privacy, and the preservation of humanistic care in education.

Keywords

Artificial Intelligence; English Language Teaching; CiteSpace; Visualization Analysis

1. Introduction

In recent years, the traditional English teaching model in China has struggled to meet the demands of educational reform in the new era. With the introduction of policy documents such as the New Generation Artificial Intelligence Development

Plan and the Artificial Intelligence Innovation Action Plan for Higher Education, intelligent technologies represented by artificial intelligence are driving a new wave of educational transformation. These technologies have demonstrated significant potential in empowering teachers and enhancing English language teaching through disciplinary integration. Furthermore, the Overall Layout Plan for the Construction of Digital China issued by the Central Committee of the Communist Party of China and the State Council has positioned educational digitization as a strategic priority. This plan promotes the systematic restructuring of the English education ecosystem and facilitates the shift toward intelligent and personalized instruction. Therefore, how to effectively integrate artificial intelligence with English teaching to make it more interconnected, open, developmental, and interactive remains a key challenge for English educators.

Research on AI-enabled English teaching first emerged in 2008 with the project "Integration and Performance Evaluation of Simulated Dialogue Contexts in English Teaching" conducted at Peking University. Currently, there is a lack of comprehensive review studies addressing the transformation of English teaching models through artificial intelligence empowerment. Based on CiteSpace software and using relevant literature from the China National Knowledge Infrastructure (CNKI) database between 2013 and 2025 as the sample, this study sorts out the developmental trajectory and research hotspots in this field, aiming to provide insights and references for the transformation of English teaching in the era of artificial intelligence.

2. Methodology

2.1. Research Questions

This paper attempts to address the following research questions:

- 1) What is the general landscape of research on AI-enabled middle school English language teaching in China from 2013 to 2025 ?
- 2) What are the current research hotspots in the field of AI-enabled middle school English language teaching ?
- 3) What are the future trajectories for AI-enabled middle school English language teaching ?

2.2. Research Methods

This study employed CiteSpace to conduct a systematic scientometric and visual analysis of the selected literature, thereby enhancing the scientific rigor, interpretability, and objectivity of the findings. CiteSpace is a Java-based application designed for the visualization and analysis of trends and patterns in scientific literature. It integrates data visualization with bibliometric techniques to explore research frontiers, identify seminal publications, and map the intellectual structure

of a knowledge domain.

In the generated knowledge maps, nodes represent entities such as authors, institutions, or keywords. The size of each node indicates its frequency of occurrence, while the strength of the links between nodes reflects the degree of co-occurrence or scholarly collaboration. CiteSpace's methodological framework incorporates co-citation analysis, keyword co-occurrence analysis, and cluster analysis, rooted in bibliometric theory and drawing on principles from applied mathematics, information science, and computer graphics.

Compared with traditional narrative literature reviews, scientometric analysis using CiteSpace offers a more systematic and replicable approach. It facilitates the identification of highly active research areas, detection of landmark or turning-point studies, and visualization of interdisciplinary linkages. This approach has been widely adopted across disciplines—including engineering, management, sociology, education, psychology, and computer science—and is particularly effective in revealing thematic evolution, collaboration networks, and emerging scholarly trends.

2.3. Data Collection

The data for this study were drawn from journal articles indexed in the China National Knowledge Infrastructure (CNKI) database. The specific procedures were as follows:

- 1) The search was conducted within the "Journal" database using "Artificial Intelligence middle school English Teaching" as the subject term. The publication time frame was set from 2013 to 2025, and the source category was defined as "All Journals." This initial search yielded 218 publications.
- 2) A manual screening process was undertaken to ensure the validity of the sample. After reviewing the content of the retrieved articles, non-research-oriented publications, duplicates, and other irrelevant entries were excluded, resulting in a final corpus of 170 valid articles.
- 3) A literature database was established. These 170 articles, which included 10 publications from core journals, were imported into the CiteSpace software for visual bibliometric analysis.

2.4. Data Analysis

This study employed a mixed-methods approach, integrating both quantitative and qualitative analysis. Utilizing CNKI database as the primary literature source, it conducted a statistical analysis of publication volumes to visualize the overall trajectory of academic output. Furthermore, the study applied the knowledge mapping software CiteSpace for keyword extraction, clustering map generation, and other corpus processing tasks. This facilitated the creation of scientific knowledge maps, enabling an in-depth analysis of research hotspots and future trends in

AI-enabled middle school English language teaching in China from 2013 to 2025 .

3. Research Results

3.1. General Landscape

3.1.1. Overall Trend

From 2013 to 2025, the number of research publications on artificial intelligence in secondary school English teaching in China showed a dynamic trend, which can be broadly divided into four developmental stages (see Figure 1).

The first stage was the plateau period (2013–2017), with only seven papers published. Research during this period focused on the application of artificial intelligence in English teaching and reform, as well as the development of intelligent English teaching systems.

The second stage was the slow development period (2018–2020), during which AI-assisted English teaching began to attract attention from Chinese scholars. The scope and perspective of research continued to expand, and the number of publications increased steadily, reaching a peak of 12 papers in 2020.

The third stage was the transitional period (2020–2022), during which research activity declined somewhat.

The fourth stage (2023–2025) is a period of flourishing development, with the number of publications rising sharply and reaching a new peak of 87 papers in 2025. This indicates that AI-assisted English teaching will remain a prominent research field in the future, and the number of publications is expected to continue growing in 2026.

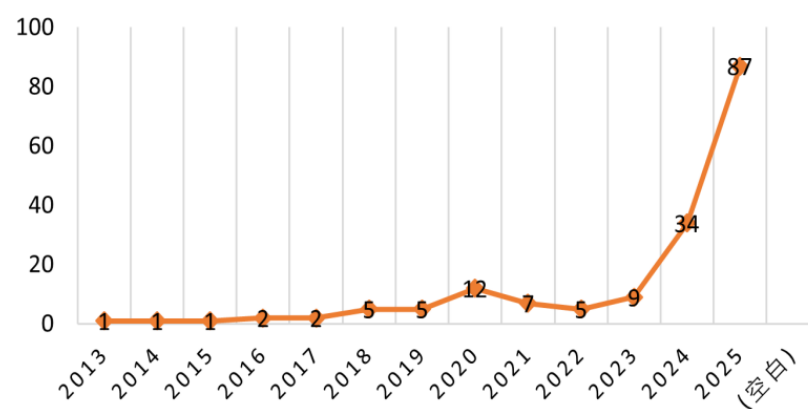


Fig 1. Literature Volume Chart over the Years

3.1.2. Analysis of Author and Research Institution Networks

Based on the visualization analysis of author collaboration in the literature using CiteSpace, the results appeared highly fragmented. Therefore, this study does not present the dispersed authors, focusing instead on the more concentrated author

network analysis (see Figure 2). It can be observed that collaboration among authors is infrequent. However, according to the author network analysis, the authors with relatively frequent collaboration in recent years are Zhao Xiaosheng and Li Zeshi, followed by Shao Mengqiu, Qin Jian, Liu Zhaoyi, Liu Hongjiang, Chen Lei, Wang Minghan, Li Kaixuan, and Pei Rongkan. Beyond these, the average number of publications per author ranges from 1 to 2 papers.



Fig 2. Co-occurrence and Cluster Analysis

From the institutional co-occurrence network (see Figure 3), collaboration between institutions is also limited. Most institutions have published only one paper, with a small number having published 2 to 3 papers, indicating a high concentration of research output. Additionally, the types of institutions are diverse, primarily including foreign language or normal universities, vocational and technical colleges, middle schools, and affiliated middle schools of normal universities. Among them, Harbin Normal University published 3 papers, making it the institution with the highest output on the topic of artificial intelligence and middle school English teaching. Other institutions are mainly concentrated in Jiangsu, Zhejiang, and Jiangxi provinces, followed by Guangdong, Hubei, and Hunan provinces. However, the average output of these institutions is only around 1 paper each.

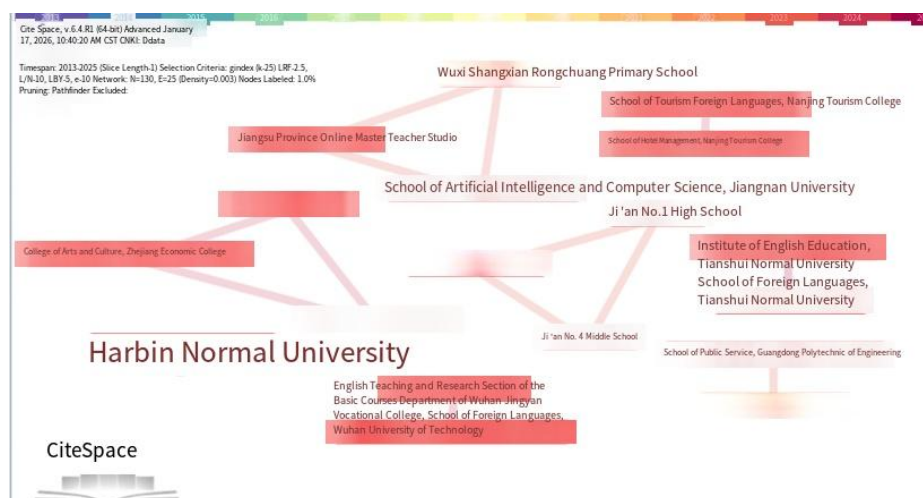


Fig 3. Institution Distribution Analysis

3.1.3. Analysis of Core Journal Paper

Based on a curated selection, data from CNKI indicates that there are 10 core journal publications focusing on artificial intelligence in middle school English teaching. The specific publication years and research directions are presented in Table 1. From 2014 to 2020, only 4 core papers were published in this field, primarily addressing listening and speaking instruction, ecological linguistics, and reflective studies on AI in English teaching. From 2021 to 2025, artificial intelligence began to attract increased attention, leading to a growth in the number of core publications.

Research content expanded to include the cultivation of subject-specific key competencies, the development of specific language skills, and learners' affective experiences. Since 2024, artificial intelligence has been increasingly referred to as "Generative Artificial Intelligence" in the literature, highlighting the considerable feasibility of its application in middle school English. Furthermore, research directions have become more specialized and in-depth, with methodologies increasingly relying on rigorous empirical studies. This reflects the formation of a systematic research framework, and the fundamental approaches for applying generative artificial intelligence in middle school English teaching have been largely clarified.

Table 1. Research Directions of Core Journal Papers in CNKI

Time	Title	Topic
2014	The Perfect Integration of Artificial Intelligence and Language Teaching: A Case Study from Tennessee State University, USA	Introducing cases and practices of integrating AI with language teaching.
2017	Reflection on Modern English Teaching in the Context of the Intelligent Era	Reflecting on the reform of English teaching objectives, content, and methods under the impact of intelligent technologies.
2019	The Application of Artificial Intelligence Technology in Blended Foreign Language Teaching and the Construction of an Ecological Chain	Constructing an ecological chain model for the deep integration of AI and blended foreign language teaching.
2020	Modern Technology Assisting Junior High School English Listening and Speaking Teaching	Exploring how AI technology helps junior high school students improve their English listening and speaking abilities.

2021	Research on Artificial Intelligence Promoting the Transformation of English Learning	Analyzing the application advantages and strategies of AI technology in English listening, speaking, reading, and writing learning.
2023	Cultivating English Subject Literacy: Strategies Based on the Educational Application of Artificial Intelligence Technology	Exploring how to utilize AI technology to cultivate core English subject literacy, particularly cultural awareness.
2024	The Impact of Artificial Intelligence on the Ecological Niche of Foreign Language Teaching from the Perspective of Foreign Language Education Studies	Analyzing the reconstructive role of AI technology on the ecological niche of foreign language teaching from the perspective of foreign language pedagogy.
2024	An Empirical Study on Generative Artificial Intelligence Technology Empowering Oral English Teaching	Verifying the enhancing effects of Generative AI technology on the complexity, accuracy, and fluency of English oral production through empirical research.
2025	Exploring Translingual Practices and Learner Agency in English-Medium Instruction Classrooms Under the Background of Generative Artificial Intelligence	Investigating how Generative AI facilitates students' translingual practices and learner agency in English-Medium Instruction classrooms.
2025	A Study on the Emotional Experience of EFL Learners in Narrative Writing Revision Mediated by Generative Artificial Intelligence: A Q-Methodology Study on Continuation Task Teaching	Exploring how Generative AI influences the emotional experience of English learners during the narrative writing revision process.

In summary, generative artificial intelligence demonstrates significant potential in the field of English language teaching and is currently in a period of vigorous development. Moreover, its application paradigms within middle school English education have been established, indicating that future research will increasingly focus on the utilization of generative artificial intelligence in specific English classroom teaching contexts.

3.2. The Current Research Hotspots

3.2.1. Analysis of Key word co-occurrence network

Figure 5 presents a clustered co-occurrence network of keywords from CNKI literature, reflecting research hotspots in this field. Within the hybrid network comprising 170 nodes, seven significant clusters were identified: "artificial intelligence," "junior high school English," "English teaching," "technological empowerment," "teaching reform," "path design," and "system design." Among these, "artificial intelligence" and "technological empowerment" are more closely associated with technology application, while the various domains exhibit a relatively distinct separation from one another.

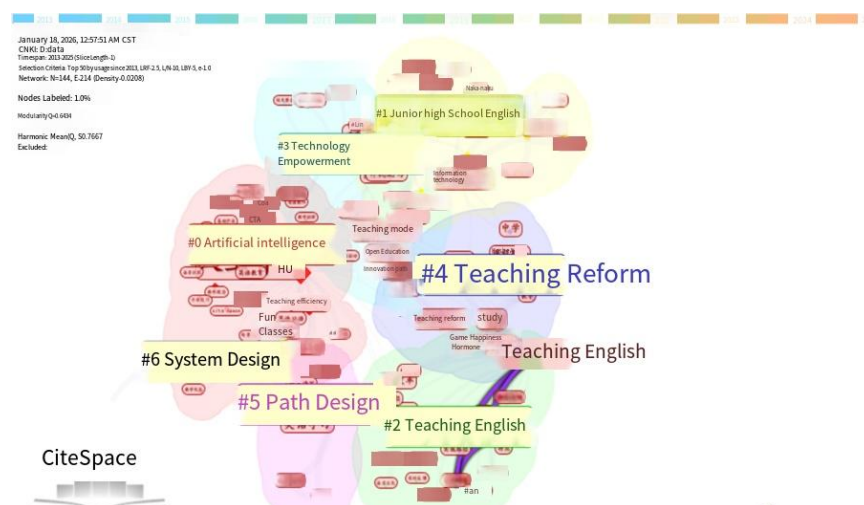


Fig 5. Keyword Hotspot Clustering Analysis

However, based on the specific content of each cluster, interconnections still exist among different domains (see Table 2). For instance, "teaching reform" may overlap with "artificial intelligence" and "technological empowerment," while "junior high school English" and "English teaching" are likely linked through specific instructional strategies and methodologies. These connections reveal potential and directions for further interdisciplinary research.

Table 2. Cluster Analysis of Keywords from Literature on AI in English Teaching Based on CNKI

Number	Cluster Title	Main Clusters
0	Artificial Intelligence	Smart Education; PAD Class; Assessment & Review System; Listening & Speaking Instruction
1	Junior High School English	Smart Education; PAD Class; Assessment & Review System; Listening & Speaking Instruction
2	English Language Teaching	Gamified Teaching; Quality Assessment; Experimental Contrast
3	Technology Empowerment	Homework Design; Dynamic Feedback; Tiered Evaluation
4	Teaching Reform	Curriculum Integration; Open Education; New Liberal Arts
5	Pathway Design	Personalization; Reform Pathways; Instructional Videos
6	System Design	Platform Design; Engaging Classroom; Teaching Efficiency

In summary, the current research focus in this field, in terms of technology, lies in "assignment design," "instructional feedback or assessment," "engaging instructional design," and "speech recognition." From a conceptual perspective, emphasis is placed on "personalization" and "curriculum integration," with the broader goal of cultivating well-rounded qualities and promoting holistic student development.

3.2.2. Analysis of Research Hotspots Timeline

The Keywords Temporal Distribution Map shown in Figure 6 reveals the research hotspots and their evolutionary relationships within the field of artificial intelligence (AI) and secondary school English teaching at different time points. Since 2016, there has been a significant increase in the number of publications on the integration of AI and secondary school English teaching. From 2016 to 2020, research primarily focused on more abstract theoretical aspects such as "balancing learning and teaching," "curriculum integration," "cooperative learning," and "teaching English listening and speaking skills." Between 2020 and 2023, the focus shifted primarily to specific English teaching strategies, such as the "application of assessment systems," and innovations in teaching models driven by AI. From 2023 to 2025, research has concentrated on more concrete areas like "enjoyable teaching," "writing instruction," and "human-computer interaction," indicating a gradual progression towards more intelligent and precise teaching methodologies. Overall, since the initial integration of AI into secondary school English teaching, research centered on "teaching reform" has been continuous, deepening, and becoming more detailed. Concurrently, studies related to "English skills teaching," "human-computer interaction," and "curriculum design" have persisted. In the

future, this research domain is expected to yield more empirical studies on the application of AI in secondary school English teaching, thereby fostering the ongoing development of English classrooms towards smart education.

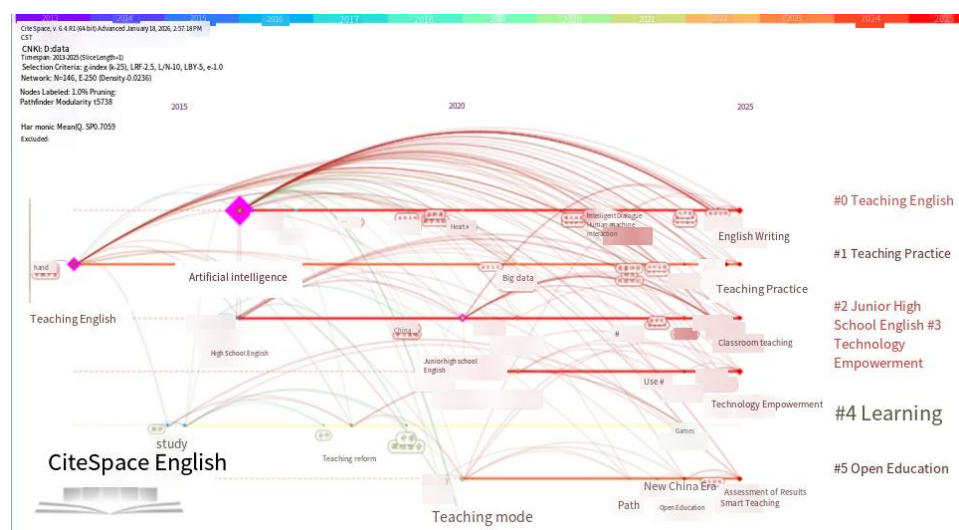


Fig 6. Keywords Temporal Distribution Map

3.3. The Future Trajectories

3.3.1. Relatively Limited Volume of Research

Although the application of artificial intelligence (AI) in English teaching has become a research hotspot, the number of related publications remains limited. According to CNKI data, a total of 5,756 documents have been published on "AI in teaching research," of which only 8.7% pertain to English teaching. This indicates that English teachers across schools and English departments in universities should join forces to collectively advance research on AI in English teaching, thereby generating more research outcomes. For example, lectures can be organized for school English teachers, and mechanisms for rewarding scientific research achievements can be strengthened.

3.3.2. Singularity in Research Methods

Prior to 2024, most studies employed speculative approaches, discussing the theoretical significance of AI in English teaching and its instructional implications, describing implementation processes, or summarizing and envisioning future outcomes. However, there is a scarcity of articles that practically serve the English teaching system, lacking empirical pedagogical research. Future studies could further explore the practical application and effectiveness demonstration of specific AI technologies (e.g., DeepSeek) in English classrooms.

3.3.3. Imbalance in Research Subjects

The Keywords Temporal Distribution Map of AI in English teaching reveals that current research in this field primarily focuses on college English education and vocational English education, with insufficient attention paid to the application of AI in English teaching at the basic education stage. Therefore, future research should expand more into primary and secondary schools, actively responding to the "Double Reduction" policy by initiating studies on the application and practice of AI in English teaching at the foundational stage. Beyond "oral English teaching" and "writing instruction," researchers should also incorporate reading and listening instruction into their scope of study to enrich research in this field.

4. Conclusion

In conclusion, this study demonstrates that AI-enabled middle school English teaching in China is at a pivotal juncture, characterized by rapid innovation but also significant challenges. The integration of AI has the potential to make ELT more interconnected, open, and interactive, offering advantages like instant feedback and personalized resources. However, realizing this potential depends on addressing limitations in research volume, methods, and scope. By prioritizing empirical applications, expanding into foundational education, and fostering collaboration, stakeholders can harness AI to support educational digitization while ensuring ethical and human-centered practices. This analysis not only maps the current landscape but also provides a roadmap for future endeavors, emphasizing the need for a balanced approach that combines technological advancement with pedagogical integrity. As the field evolves, continuous reflection and adaptation will be essential to achieve sustainable and inclusive educational transformations. Based on a bibliometric analysis of literature on AI-enabled English language teaching published in CNKI from 2013 to 2025, this study finds that, with technological advancement, the integration of artificial intelligence and secondary school English teaching is deepening and becoming more detailed, gradually shifting from theory to practice. The main research bodies are vocational colleges and universities, though collaboration among researchers and institutions remains limited. Research hotspots include "teaching transformation," "teaching models," "applied research," and "oral English teaching." Future research should focus on "English listening and speaking teaching," "writing instruction," and "teaching feedback," guided by the broader direction of "teaching transformation," to further explore the practical application of artificial intelligence in secondary school English teaching.

Relevant authorities may also promote the production of literature in this field, targeting primary and secondary schools more frequently, actively responding to the "Double Reduction" policy, exploring ways to use artificial intelligence to alleviate students' academic burden, and conducting data-supported teaching experiments to enrich research in this area. Artificial intelligence offers advantages in English teaching practice, such as instant feedback, multi-dimensional evaluation,

personalized recommendations, and unlimited resource expansion, which can help implement the "Double Reduction" policy and reduce the workload of teachers. On the other hand, the integration of AI information technology and English teaching requires collaborative efforts among government departments, English teachers, universities, and enterprises to leverage the full potential of artificial intelligence and achieve harmonious coexistence between humans and technology.

References

- [1] An, X., Shen, X., Zhou, Y., Bai, J., & Li, Y. (2023). The integration and development of artificial intelligence and teaching from the perspective of English teachers: Opportunities, challenges, and improvement paths. *Modern Educational Technology*, (2), 71 – 79.
- [2] Chen, K., Hu, X., Han, X., Niu, C., Han, Y., Wang, X., Zhang, K., & Lyu, W. (2023). Mechanisms, scenarios, challenges, and countermeasures of conversational general artificial intelligence in educational applications. *Distance Education Journal*, 41(3), 21 – 41.
- [3] Chen, M., & Lyu, M. (2024). College English writing teaching in the ChatGPT environment. *Contemporary Foreign Languages Research*, (1), 161 – 168.
- [4] Chen, W., Jia, J., & Xiang, D. (2008). An application study of the AI teaching system 'Ceice' in high school English classrooms: Design-based research. *China Educational Technology*, (2), 109 – 114.
- [5] Cheng, H., Ji, W., & Pei, R. (2024). Research progress on the application of artificial intelligence in English teaching (2000-2024): A visual analysis based on CNKI and WOS journal literature. *Journal of Lvliang Education Institute*, 40(4), 12 – 22.
- [6] Chu, J., & Li, Y. (2022). The technological forces of educational change in the intelligent era and the avoidance of educational risks. *Modern Educational Technology*, 32(6), 43 – 50.
- [7] Gan, R., & He, G. (2015). Value orientation and realization paths of higher education reform in the big data era. *China Educational Technology*, (11), 70 – 76, 90.
- [8] Gu, X., & Li, S. (2021). The AI education brain: A technical framework for data-driven educational governance and teaching innovation. *China Educational Technology*, (1), 80 – 88.
- [9] He, K. (2014). An overview of big data. *e-Education Research*, 35(10), 8 – 16, 22.
- [10] Hou, J. (2019). The transformation of English oral teaching models in the artificial intelligence era. *Teaching and Administration*, (33), 86 – 88.
- [11] Hu, Q., Wu, W., Feng, G., Pan, T., Chen, Z., & Qiu, K. (2021). Key technologies and practices of higher education teaching evaluation in the artificial intelligence era. *Open Education Research*, 27(5), 15 – 23.
- [12] Hong, C. (2018). Research on the construction of an ecological teaching model for college English in the artificial intelligence era. *Foreign Language Learning Theory and Practice*, (6), 29 – 34.
- [13] Huang, S., Li, H., Wang, S., Liang, J., & Xu, B. (2009). An automatic fluency scoring method in an assisted speech scoring system. *Journal of Tsinghua University (Science and Technology)*, (S1), 1349 – 1355.
- [14] Jia, J. (2006). Exploring the application of AI technology in distance education: The 'Ceice' intelligent online English learning system. *Modern Educational Technology*, (2), 26 – 29, 21.
- [15] Jia, J., Chen, F., Chen, Y., & Ding, Z. (2011). From chatbot to vocabulary testing and course management: Further development of the 'Ceice' intelligent English teaching system.

Modern Educational Technology, (6), 86 – 90.

- [16] Jiao, J., & Chen, T. (2023). Empowering English teaching with large language models: Four scenarios. *Foreign Language Learning Theory and Practice*, (2), 12 – 17, 106.
- [17] Kong, L. (2024). The application of generative artificial intelligence in foreign language major teaching: Taking the teaching of 'College English: Critical Thinking and Reading' as an example. *Foreign Language Education in China*, 7(1), 11 – 18, 90.
- [18] Ke, R. (2025). The feasibility and challenges of AI-assisted integration of teaching, learning, and assessment in junior high school English classrooms. *Campus English*, (6), 79 – 81.
- [19] Ke, Q. (2013). Big data and smart education. *China Education Info*, (24), 8 – 11.
- [20] Li, T., & Fu, G. (2010). Analysis of the status and trends of educational data mining research domestically and internationally. *Modern Educational Technology*, (10), 21 – 25.
- [21] Li, X. (2025). Exploring professional development paths for college English teachers in vocational colleges under the background of artificial intelligence. *Modern Vocational Education*, (7), 61 – 64.
- [22] Li, Y. (2019). Research on the application of artificial intelligence in English teaching in higher vocational colleges under the information technology environment. *Journal of Liaoning Provincial College of Communications*, (3), 88 – 91.
- [23] Li, Y. (2025). Research on AI-assisted professional development and teaching transformation of college English teachers. *Intelligence*, (34), 129 – 132.
- [24] Liu, B., & Yu, X. (2025). Development trends of artificial intelligence research in the field of vocational education: A bibliometric analysis (2000-2024). *Vocational Education*, (32), 22 – 29, 35.
- [25] Liu, B., & Li, Y. (2025). Challenges and coping strategies of AI-empowered college English teaching. *Modern English*, (7), 42 – 44.
- [26] Jiang, Y., & Ma, J. (2020). Modern technology assisting junior high school English listening and speaking teaching. *Basic Education Curriculum*, (10), 59 – 63.
- [27] Qiao, H., & Shan, Y. (2025). A bibliometric analysis of generative artificial intelligence in teaching application scenarios. *Journal of Hebei Open University*, (3), 36 – 43.
- [28] Shao, M., Qin, J., Zhao, X., & Liu, Z. (2021). Cultivating English subject literacy: Application strategies based on artificial intelligence technology. *China Medical Education Technology*, (4), 437 – 442.
- [29] Shen, X. (2025). Stage division and experience analysis of China's English teaching development from the perspective of technological progress. *Overseas English*, (8), 115 – 117.
- [30] Su, T. (2021). An innovative practical exploration of college English mobile teaching mode under the background of intelligent education. *Journal of Baise University*, (3), 133 – 138.
- [31] Su, Y. (2023). Research on English teaching for textile business and foreign trade majors based on artificial intelligence education: A review of Textile Business and Foreign Trade English. *Wool Textile Journal*, (12), 142 – 143.
- [32] Tan, X. (2026). The 'change' and 'invariance' of college English teaching in the context of generative artificial intelligence. *Language and Culture Research*, 28(1), 111 – 114.
- [33] Tian, Z., & Peng, Y. (2022). Research progress in computer-assisted language learning under the background of artificial intelligence (2011 – 2021). *Foreign Language World*, (3), 53 – 60.
- [34] Wang, C. (2023). Domestic trends and research hotspots in computer-assisted language learning: Keyword analysis based on 10 CSSCI journals (2018-2022). *Campus English*, (12), 187 – 189.

- [35] Wang, S., Fang, H., Zhang, G., & Ma, T. (2019). Research on a new type of 'dual-teacher classroom' supported by AI educational robots: Also on the teaching design and future prospects of 'human-computer collaboration'. *Distance Education Journal*, (2), 25 – 32.
- [36] Wang, H. (2024). Exploring the application of generative artificial intelligence in college English teaching reform: Taking the teaching reform practice of the 'General Academic English Writing' course as an example. *Foreign Language Education in China*, (4), 41 – 50, 95.
- [37] Wang, Q. (2001). Theories and technologies of computer-assisted second language learning. *e-Education Research*, (12), 22 – 25.
- [38] Wang, W. (2024). A practical study on AI-empowered improvement of English listening and speaking abilities among junior high school students. *Journal of Jilin Provincial Institute of Education*, (12), 80 – 84.
- [39] Wen, Q. (2024). English education in the AI era: An analysis of the four-element new curriculum model. *Foreign Languages in China*, (3), 1, 11 – 18.
- [40] Wu, J., Zhou, W., & Cao, C. (2024). An empirical study on generative AI technology empowering oral English teaching. *China Educational Technology*, (4), 105 – 111.
- [41] Wu, Y., Chen, D., Ma, X., Cao, P., Feng, X., & Zhu, Z. (2013). Learning analytics: A new wave of educational informatization. *Distance Education Journal*, (4), 11 – 19.
- [42] Xu, A., & Tang, M. (2025). Research on an AI-empowered blended teaching model for disciplinary English. *English Square*, (30), 67 – 70.
- [43] Xu, X., & Lu, Y. (2024). A practical exploration of generative artificial intelligence assisting junior high school English writing teaching. *English Teaching & Research in Schools*, (4), 49 – 53.
- [44] Yan, K., Hu, G., Wei, S., Li, M., Yang, X., & Feng, G. (2010). A preliminary study on automatic scoring technology for English recitation questions using computers. *Computer Applications and Software*, (7), 164 – 168.
- [45] Yan, Y. (2019). Exploring paths for promoting students' deep learning in English teaching in the artificial intelligence era. *Teaching and Administration*, (27), 106 – 108.
- [46] Yang, S. (2025). The transformation of English teaching models in the digital intelligence era and coping strategies. *Foreign Languages Research*, 42(3), 18 – 22.
- [47] Yu, G., Li, F., & Teng, W. (2024). AI + Education: The dimensional elevation and transformation of teaching models in the AI era. *Social Sciences in Ningxia*, (2), 191 – 198.
- [48] Zhang, F. (2026). AI empowerment: Solving the pain points of English teaching in county-level junior high schools. *Duxie Suan*, (1), 166 – 168.
- [49] Zhang, X. (2006). Theoretical foundations and influencing factors of computer-supported collaborative language learning. *Computer-Assisted Foreign Language Education*, (4), 30 – 35.
- [50] Zhang, Y. (2019). Research on AI promoting college English teaching reform. *Education Modernization*, (55), 130 – 131.
- [51] Zhang, Z., Zhang, L., Xu, X., & Liu, J. (2019). Metaphorical analysis of AI's teaching roles: Taking influential projects in the field of AI educational application as examples. *Distance Education in China*, (11), 24 – 37, 57, 93.
- [52] Zhang, Z., Zhang, L., & Li, M. (2019). An ideal analysis of AI educational applications: The inevitability and possibility of teaching automation. *Distance Education in China*, (1), 25 – 35, 92.
- [53] Zhang, Z., Zhang, L., Luo, Q., & Zheng, W. (2019). A practical analysis of AI educational applications: Methods and limitations of teaching automation. *Distance Education in China*, (3), 1 – 13, 92.
- [54] Zhao, L. (2026). Integration paths and practical exploration of artificial intelligence in

- the English teaching of 'Survey of Chinese Culture'. *Language and Culture Research*, 28(1), 128 – 132.
- [55] Zhao, L., Zuo, M., & Huang, X. (2023). The direction of change in higher education teaching in the AI era: Cultivating higher-order thinking. *Journal of Beijing Normal University (Social Sciences Edition)*, (4), 40 – 48.
- [56] Zheng, Y., Chen, T., & Cai, Y. (2025). Technological empowerment, application risks, and promotion directions of AI in middle school English teaching: Reflections based on the report 'AI and English Teaching: Preparing for the Future'. *Basic Education Curriculum*, (7), 41 – 49.
- [57] Zhu, Z., & Shen, D. (2013a). A new paradigm for educational technology research based on big data. *e-Education Research*, 34(10), 5 – 13.
- [58] Zhu, Z., & Shen, D. (2013b). Learning analytics: The scientific power of smart education. *e-Education Research*, 34(5), 5 – 12, 19.
- [59] Zhu, Y., Wang, C., & Jin, H. (2021). Research on computer-assisted language learning in the intelligent era. *Foreign Language Education*, 42(5), 51-56.