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Research on the Application of AI in Chinese Native Language Teaching

Yu Wang

The Education University of Hong Kong, Hong Kong, China
18310680605@163.com

Abstract. This paper examines the transformative potential of integrating AI technology into Chinese native language classrooms. Grounded in constructivist theory, it explores AI's role in innovating teaching methods, enhancing student engagement, and improving instructional efficiency. The study employs literature reviews, interviews, comparative studies, and case analyses to summarize practical AI applications in Chinese language education. The study delineates the significance of artificial intelligence in the formulation of instructional design, the customization of learning experiences, the enhancement of educational resources, the creation of immersive learning environments, the provision of immediate feedback, and the facilitation of automated assessment. Furthermore, the research examines obstacles such as technological constraints and the integration of AI within existing curricula. It suggests strategies to leverage AI for enhancing Chinese language teaching, aiming to reduce teaching pressures, improve digital literacy among teachers, and support professional development. Alternatively, the investigation examines the potential of artificial intelligence to revolutionize pedagogical approaches, augment student involvement, and optimize instructional efficacy. The findings indicate that although AI offers considerable prospects for the advancement of Chinese language education, continuous inquiry and adaptation to its dynamic environment remain imperative.

Keywords: AI technology, Chinese native language teaching, constructivism, multimodal teaching, smart classroom

1. Introduction

The emergence of AI technology has provided Chinese language classrooms with transformative and empowering thinking, methods, and tools. This development presents unprecedented opportunities to better cultivate students' core competencies and enhance frontline educators' teaching abilities.

The strategic utilization of artificial intelligence technology to transform pedagogical approaches in the classroom, highlight the allure of traditional Chinese culture, bolster students' essential competencies, and ultimately enhance the quality of Chinese language education, while simultaneously advancing the proficiency of frontline educators in artificial intelligence, will emerge as a central concern for all professionals engaged in the instruction of the Chinese language [1].

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Based on constructivist theory, this study aims to address the comprehensive scenarios of Chinese native language classroom instruction. This includes, but is not limited to, lesson plan design, teaching interactions, assessment methods, and feedback mechanisms. We will summarize existing practical experiences and explore strategies and methodologies for leveraging AI technology to enhance Chinese native language classroom teaching.

Functions in AI technology such as intelligent teaching systems, speech recognition, data analysis, text-to-image conversion, and AI virtual characters can assist in the design and generation of teaching content, composition tutoring, the design of personalized learning plans, classroom interaction and language generation, poetry recitation and memory consolidation, students' language expression training, after-class learning resources, student assessment and feedback, and multicultural learning. Front-line Chinese language educators can be supported in the development of comprehensive and innovative repositories of teaching resources, the creation of immersive pedagogical environments, the facilitation of personalized learning experiences, the in-depth exploration of cultural contexts, and the design of inventive assignments [2].

Utilizing AI empowerment as a foundational approach, this research endeavors to enhance the efficiency of lesson preparation, facilitate personalized learning experiences, augment teaching resources, develop immersive learning environments, provide real-time feedback, and implement automated assessment mechanisms. The objective is to contribute to the theoretical advancements in the pedagogy of Chinese language instruction [3].

Based on the entire process of pre-class preparation, in-class teaching, after-class improvement, and teaching management, the exploration of the full-scenario application of AI teaching aims to alleviate the teaching pressure on front-line Chinese language teachers, enhance their digital literacy, and support their professional development.

It helps front-line Chinese language teachers improve teaching management and assessment, create smart classrooms, and cultivate students' core competencies.

It assists students in active and autonomous learning and increases their interest in learning Chinese as their mother tongue.

2. Theoretical framework

2.1. Constructivist theory

Constructivism represents a theoretical framework concerning knowledge acquisition and learning, highlighting the proactive engagement of learners. It asserts that learning constitutes a dynamic process wherein individuals derive meaning from their existing knowledge and experiences, frequently facilitated by social and cultural interactions [4]. The four key elements of a constructivist learning environment are "situation," "collaboration," "dialogue," and "meaning construction." Knowledge is acquired by learners in a specific social and cultural context, with the help of others (including teachers and peers), using necessary learning materials, through the process of meaning construction. This perspective highlights the active role of individuals in the knowledge construction process.

2.2. "New Liberal Arts" educational philosophy

The "New Liberal Arts Construction Declaration" underscores the necessity for the integration of interdisciplinary knowledge to tackle multifaceted challenges and foster holistic development [5]. The new liberal arts educational philosophy requires a grounding in specific social contexts,

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breaking down disciplinary barriers, and fostering interdisciplinary integration. It advocates for cross-cultural, cross-platform, cross-domain, and cross-technological approaches to deepen the integration within liberal arts and between humanities and natural sciences, ensuring that the mission and capabilities of the disciplines align and empowering the self-renewal of liberal arts.

2.3. Multimodal teaching theory

The theory of multimodal instruction is grounded in the principles of social semiotics and multimodal frameworks. It posits that learners assimilate knowledge through various sensory modalities and communication channels, thereby enhancing engagement and comprehension across diverse learner profiles [6]. Traditional teacher-centered, single-modal teaching methods are inadequate for meeting the diverse learning needs of students. Multimodal teaching, by integrating various symbols and tools, better aligns with the demands of modern educational informatization.

3. Research methodology

The research methodology includes literature review, interview surveys, comparative studies, and case analysis. The study uses CNKI as the retrieval platform to summarize and refine the application experiences of AI in Chinese native language classroom teaching. The AI teaching assistant platform, Wenxin Yiyan, is used as a tool, with constructivism as the theoretical foundation, to explore the role of AI in Chinese native language teaching. The research involves designing and implementing teaching plans using Wenxin Yiyan, summarizing the problems encountered in AI applications during the process, and proposing targeted improvement suggestions.

4. Research findings

4.1. Mainstream teaching methods of constructivism in Chinese native language classroom teaching

The mainstream teaching methods of constructivism in Chinese native language classroom teaching include scaffolding teaching, anchored instruction, and random access instruction.

Scaffolding is an instructional practice where teachers provide support to students to help them achieve a higher level of understanding and skill acquisition. The provision of support is systematically diminished as students demonstrate increased proficiency, thereby enabling them to engage in more complex tasks autonomously. The fundamental principle of scaffolding resides in its inherent flexibility; it can be customized to address the varied requirements of learners, rendering it an invaluable resource within educational settings.

4.1.1. Theoretical foundations

The concept of scaffolding is rooted in Vygotsky's theory of the Zone of Proximal Development (ZPD), which posits that learners can achieve higher levels of understanding with the help of a more knowledgeable other, such as a teacher or peer [7]. This collaborative approach fosters a deeper understanding of content and encourages critical thinking skills.

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4.1.2. Advantages of scaffolding

Implementing scaffolding in education offers numerous benefits: Scaffolding helps students build on their existing knowledge, making it easier to grasp new concepts. Through the provision of systematic support, learners are more inclined to interact with the content and engage actively in their educational processes. Scaffolding techniques promote better retention of information, as students are guided through the learning process. As students gain confidence and competence, they become more independent learners, capable of tackling challenges without constant support 2.

So, in the education field, AI can be used reasonably by Chinese teachers to teach or learning from students.

4.1.3. Practical examples of scaffolding

(1) Reading Comprehension

In a reading lesson, a teacher might start by introducing key vocabulary words that students will encounter in the text. Subsequent to elucidating the definitions and presenting illustrative examples, the educator may facilitate the reading process for the students, intermittently pausing to pose inquiries and enhance comprehension. As students become more confident, the teacher gradually reduces support, allowing them to read independently. Artificial intelligence can replace the role of the teacher, can be used by learners to analyze and solve problems, can become an auxiliary tool for learners' reading, and can improve learners' comprehension ability [8].

(2) Writing Skills

When teaching writing, AI can provide a structured outline for students to follow. Initially, AI can provide students with reference opinions. As students become more proficient, they can create their own outlines and write independently, using the skills they have developed.

(3) Language Learning

In language classes, AI as scaffolding can involve teaching vocabulary and grammar rules before asking students to engage in conversation. For instance, DOUBAO AI can create agents, which can be designed into any object. For instance, a second language learner can design an English-speaking companion to practice with and correct their usage of English vocabulary and grammar.

4.2. AI application value and scenarios in Chinese native language classroom teaching based on constructivist theory

Artificial intelligence technologies, including intelligent instructional systems, speech recognition, automated writing assistance, AI-generated presentations, data analytics, text-to-image synthesis, and virtual AI personas, can facilitate the development and creation of educational materials, essay guidance, tailored learning strategies, classroom engagement, language generation, poetry recitation, memory reinforcement, language proficiency training, supplementary learning resources, student evaluation and feedback, as well as multicultural education initiatives. These technologies help frontline teachers build more expansive and innovative teaching resource libraries, create immersive teaching environments, promote personalized learning, deeply explore culture, and design innovative assignments.

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4.3. Problems and defects in the application of AI in Chinese native language teaching

4.3.1. Technical limitations of AI in Chinese L1 education

On one hand, there exist deficiencies within Natural Language Processing. Primarily, automated writing evaluation (AWE) systems demonstrate Type II errors in the realm of pragmatics, wherein syntactically correct constructions are semantically unsuitable (for instance, the erroneous application of euphoric idioms in dysphoric contexts). Second, Empirical data indicate 23% error rates in grapheme-to-phoneme conversion for heterophonic homographs and sub-60% accuracy in low-resource dialectal speech recognition. Neural machine translation (NMT) architectures lack enculturated knowledge bases, resulting in literal interpretations of figurative language (e.g., Third, decomposing allegorical chengyu into constituent morphemes).

On the other hand, it can also be neglected that generative artificial intelligence has constraints. Transformer-based text generation models demonstrate latent space collapse, producing lexically overlapping outputs (measured at 68% n-gram repetition in student assignments). Current sentiment analysis architectures fail to capture pragmatic markers of emotional valence gradation, defaulting to binary positive/negative classification.

4.3.2. Curricular integration challenges

While contemporary language curricula emphasize metacognitive skills, NLP tools predominantly target remember/understand-level taxonomies through token-level error detection.Learning Style Oversimplification: Collaborative filtering algorithms in adaptive learning systems rely on unidimensional proficiency metrics, neglecting VARK modality preferences. Moreover, the intricacy of interfaces in intelligent tutoring systems (ITS) generates unnecessary cognitive burden, as evidenced by 45% of educators indicating a requirement for on-demand training. In addition, Black-box models generate non-actionable feedback (e.g., "improve coherence"), lacking epistemic transparency for pedagogical adaptation.

4.3.3. Sociotechnical risks

Third-party learning analytics platforms exhibit data monetization behaviors contrary to FERPA compliance norms. Automated essay scoring (AES) systems reinforce dominant discourse patterns through latent semantic indexing biases.

5. Suggestions and strategies for the application of AI in Chinese native language teaching

The limitations of the research are reflected in the rapid development of AI technology, the wide range of AI teaching assistant platforms, and their frequent updates. This can lead to limitations in the application of AI technology during the research process, resulting in technological or informational lag. Furthermore, the instructional resources available for native Chinese language classrooms are often inadequate, and the integration of artificial intelligence technology may not achieve optimal standards. Teaching practices may not be proficient or flexible enough, and considerations may not be thorough. The ability to control classroom rhythm and guide students when integrating AI technology needs improvement. Future research will involve learning from the theoretical achievements and practical experiences of experts and top scholars, as well as frontline teachers, and fully studying relevant educational theories and technologies. The research will be further developed in future practical work and teaching.

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6. Conclusion

In conclusion, this study has thoroughly examined the integration of AI technology within Chinese native language teaching. The findings highlight the remarkable potential of AI. It can create immersive learning scenarios through virtual characters, offer real-time feedback on students' writing with intelligent writing tools, and even assist in generating teaching PPTs, thus innovating teaching methods and significantly enhancing student engagement.

Nonetheless, a multitude of obstacles hinders its extensive implementation. Technically, issues like the 23% error rate in grapheme - to - phoneme conversion for heterophonic homographs and the failure of sentiment analysis architectures to capture emotional nuances precisely limit AI's effectiveness. Curricular integration is also difficult, as NLP tools often do not match the metacognitive skill-focused curricula. Moreover, sociotechnical risks such as data monetization by third-party platforms violate privacy norms.

To fully realize AI's potential, future research must focus on refining algorithms to improve accuracy, developing curriculum-integrated AI applications, and formulating strict ethical and privacy-protection guidelines. Additionally, continuous professional development for teachers to proficiently use AI in teaching is essential. Only through these concerted efforts can AI be effectively utilized to transform Chinese native language teaching and better nurture students' language skills.

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