Reconstruction of Teacher Student Interaction Mode Empowered by Intelligent Technology: Research on Human Computer Collaborative Teaching Strategies for Chinese High School Chinese Language Classrooms

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Abstract. Against the backdrop of generative artificial intelligence driving the digital transformation of education, high school Chinese oral teaching faces long-term challenges of insufficient interactive depth and limited personalized guidance. This article primarily addresses how human-machine collaboration can reconstruct the teacher-student interaction mode in high school Chinese language classrooms to improve the quality and effectiveness of oral teaching. The study focuses on the reconstruction of the tripartite interactive relationship between "teacher student Artificial Intelligence (AI)" as the central theoretical thread, and systematically sorts out the changing characteristics of classroom interaction in terms of subject role division, interactive structure form, and teaching scene extension under the background of intelligent technology empowerment. The key technologies represented by speech recognition and education models have changed the interactive mechanism of oral teaching by providing instant feedback, generating contextualized content, and supporting multidimensional dialogue. Although notable progress has been achieved in practical applications, this study also points out that there are still practical challenges such as insufficient technological adaptability, lagging teacher professional development, and the urban-rural "digital divide". Therefore, in the future, efforts need to be made to develop subject specific intelligent agents, establish a normalized teacher collaborative development mechanism, and establish scientific ethical and evaluation standards to promote the integration of human-computer collaboration from "demonstrative applications" to "normalized and deep" classroom ecology, ultimately serving the comprehensive improvement of students' language construction and application core literacy.

Keywords: Human Computer Collaboration, High School Chinese Oral Teaching, Classroom Interaction Mode, Intelligent Technology Empowering, Language Construction and Application

1. Introduction

1.1. Research background

Nowadays, the combination of intelligent technology and language teaching has been going on for quite a long time. As early as the 1980s, intelligent technology was initially applied to the field of foreign language teaching. Intelligent language teaching has long constituted a key research focus in the field of language education technology. Research on the language learning process and teaching mode innovation supported by intelligent technology has received long-term attention from the academic community. Huazhong University of Science and Technology has developed China's first intelligent educational robot, the Han-I intelligent educational robot, marking the beginning of the application of intelligent technology in the field of education in China. After 2012, research on international intelligent language teaching entered a rapid development stage [1]. Against the backdrop of breakthroughs in generative artificial intelligence technology, the digitization of education is transitioning from a "tool-assisted" to a new stage of "ecological reconstruction". In the high school Chinese language subject, which focuses on language construction and application, thinking development and improvement, aesthetic appreciation and creation, and cultural inheritance and understanding, oral expression teaching plays an important role and faces new opportunities and challenges in the context of rapid development of intelligent technology.

The rise of generative artificial intelligence, represented by big language models, has spurred practical changes in human-computer collaborative Chinese language teaching and is driving Chinese language teaching into the era of human-computer collaboration. Existing research has achieved notable advances in theoretical framework construction, such as proposing the overall design of human-computer collaborative Chinese language teaching [2]. It has also been noted that most of the existing research has started from a single element and proposed a systematic "human intelligence collaborative eight element model" [3]. However, the exploration of existing achievements tends to focus on macro frameworks and element analysis, or on broad technical application scenarios, but systematic research on high school Chinese oral expression ability is still insufficient.

The lack of in-depth research is particularly evident in the field of oral teaching in high school Chinese language classrooms. From the perspective of the curriculum, there are problems such as a lack of textbook support, arbitrary teaching, and a lack of evaluation standards; From the perspective of teacher-student interaction in teaching, there are common problems such as students expressing anxiety and teachers' personalized guidance being difficult to cover all students in the teaching class.

To systematically and objectively answer the above questions, this study adopts a systematic literature review as the core research method. Specifically, this study followed the key steps of a systematic review [4]. Firstly, using keywords such as "human-machine collaboration", "intelligent technology", "Chinese language teaching", "oral expression", and "teacher-student interaction", a combination search was conducted on literature published in Chinese and English databases such as CNKI and Web of Science between 2018 and 2025; Subsequently, based on the relevance and research quality of the topic of high school Chinese oral teaching, the literature was screened and focused; Finally, based on the selected literature, the analysis framework and discourse logic of this review are constructed by summarizing, comparing, and integrating core themes such as "interactive mode reconstruction", "technology empowerment mechanism", and "teaching strategy design".

1.2. Core research questions

Based on the analysis of the research background and literature above, when intelligent technology is integrated into the classroom, the core problem becomes apparent: how can the existing human-machine collaboration model systematically reconstruct the complex and weak teacher-student interaction relationship and teaching process in high school Chinese oral teaching, so as to improve the quality and effectiveness of high school students' oral expression ability? To answer this core research question, this literature review will systematically sort out several dimensions, including the reconstruction of teacher-student interaction mode, key technology empowerment interaction mechanism and integration mode, core teaching strategies and typical case design, and the reconstruction of implementation review and evaluation indicators in colleges and universities.

2. The reconstruction dimension of interactive mode: focusing on "teacher student" interaction

With the deep integration of artificial intelligence technology into high school Chinese language classrooms, the traditional "teacher-student" binary interaction model, which is mainly based on teacher lectures and passive student acceptance, is gradually being broken. Teaching researchers are starting to explore how to break through the old model and establish new models from different dimensions. The existing literature will discuss three interrelated dimensions: the subject, structure, and scenario of interaction.

2.1. Subject reconstruction: from "teacher led" to "teacher-student co-guidance and intelligent assistance"

In traditional high school Chinese language classrooms, teachers are usually the sole disseminators of knowledge, and the form of oral teaching is often through teachers reading aloud and students following along. In this mode, students have limited opportunities for oral participation, which hinders the development of their expression of enthusiasm. Students lack opportunities for independent thinking and in-depth study of texts, making it difficult to promote further development of their thinking. At the same time, the knowledge retention rate of one-way knowledge transmission is low, and there is a lack of timely feedback and targeted training, which can easily lead to the situation of "teaching multiple times but not learning", resulting in a mismatch between teaching input and output. Compared to reading and writing, oral teaching accounts for a relatively low proportion in high school Chinese language teaching. In actual teaching, oral feedback mostly stays at the surface level of volume and emotion, lacking specific and executable improvement suggestions for speed, rhythm, logic, and wording. In addition, the large class teaching in high school classrooms is difficult to provide detailed oral attention and guidance for every student. Due to the difficulty in obtaining targeted feedback in a timely manner, students' motivation to continuously improve their expression is affected. Thus forming a fixed expression problem that is difficult to reverse.

In the high school Chinese language classroom empowered by artificial intelligence technology, teachers have experienced a role transformation, from being the sole disseminators of knowledge in the past to designers of the learning process, guides for deepening thinking, and supporters of emotional values. Students transform from passive knowledge receivers to participants and collaborators, actively constructing in their interaction with Artificial Intelligence(AI). The traditional binary subject of "teacher student" is transforming into a tripartite collaborative

relationship of "teacher student machine", which reflects the shift of teaching philosophy from knowledge transmission to process guidance. Teachers are no longer simply imparting knowledge, but carefully planning learning experiences, guiding students to actively explore and think, while providing emotional and value-based support, thus comprehensively improving the quality of education. For example, when teaching Xianglin Sao at Beijing No.12 Middle School, teachers no longer rely on sentence by sentence narration of the text, but instead pre-organize key and challenging instructional points of teaching, design exploratory tasks, guide students to use AI tools to analyze literary images, and independently explore the fate and social roots of the characters [5]. The concept of "teacher-led design" emphasized by Shenzhen Hongling Education Group coincides with each other, that is, teachers guide students to improve their thinking ability through self-directed exploration by designing progressive learning tasks [6]. In the June 2025 summary of teaching and research in Jiading District, Shanghai, it was pointed out that while the role of teachers is shifting towards being "designers of learning experiences," AI provides important support throughout the entire process of teaching evaluation [7]. The core of this restructuring is the reorganization of the interactive relationship among three dimensions, with the goal of forming a tripartite collaboration of "teacher-led design, AI-supported training, and student-initiated construction".

2.2. Structural reconstruction: from "one to many lectures" to "human computer symbiosis and multidimensional dialogue" in the network

In traditional high school Chinese language classrooms, the vast majority of teachers often intentionally or unconsciously ignore the interaction with students for the sake of course progress and consideration of teaching Chinese exam skills. However, in the emerging high school Chinese language classroom where artificial intelligence technology is integrated, classroom interaction gradually presents the characteristics of multi-subject participation. It includes "human-computer interaction": in this process, AI leverages its powerful knowledge base function to help students expand their reading and learning; AI uses the segmentation function of extracting key points from text to help students learn how to quickly organize the plot of an article, and enables students to use intelligent tools to generate mind maps that are conducive to learning. For problems such as translating difficult-to-understand classical Chinese, students ask AI questions to improve their accuracy, higher-order thinking, and problem-solving abilities through "human-computer interaction" [6]. In addition, AI has also promoted the transformation of "student student interaction" from a single oral discussion based on the personality of the course content to multiple forms: in the typical lesson sharing activity of AI empowered basic education teaching reform held at Tianjin No. 42 Middle School, the "Chu Shi Biao" debate teaching allowed students to first have group debates, then use large-scale AI models to generate rebuttal viewpoints for "human-machine debates", and finally guide students to summarize and sublimate based on the support rate data of various viewpoints summarized by AI. In this process, the smart teaching system can analyze classroom interaction data, such as viewpoint support rate in real time, and provide timely feedback to teachers and students through logical prompts and data dashboards, so that subsequent interactive discussion sessions are based on data observation rather than simple experience. Such interactions enable targeted responses to student expression based on real-time data [8]. Artificial Intelligence Generated Content(AIGC) can deepen students' understanding of the text by constructing historical scenes, generating visual materials, and creating conditions for multiple rounds and multi-role dialogues [9].

2.3. Scene reconstruction: from "physical classroom space" to "virtual reality integration and continuous feedback" interactive scene

In addition to the reconstruction of structure and subject, the integration of AI into high school Chinese language classrooms is mainly reflected in the reconstruction of teaching scenarios in terms of time and space. Teaching scenarios expand from physical classrooms to AI-generated virtual contexts generated by AI in terms of space; In terms of time, the continuous learning process that extends from fixed class hours to covering the entire classroom transcends traditional temporal and spatial constraints in learning and expands the field of learning and interaction.

In the process of high school Chinese language teaching, teachers use AI's ability to generate images and text to construct special text scenes, such as literary imagery that are far from students' daily lives, providing students with concrete cognitive frameworks [9]. In the typical lesson-sharing activity of AI empowered basic education teaching reform held at Tianjin No.42 Middle School, AI intelligent agents such as "Sun Wukong" and virtual humans were introduced into the classroom, creating highly immersive dialogic scenarios and enabling students to interact with classic literary images across time and space [8]. Through continuous dialogue with customized intelligent agents, students explore the deep meaning and philosophical ideas of texts both inside and outside the classroom, extending interactive scenarios to personalized learning spaces.

In similar classroom teaching practices, AI has not only been limited to shallow applications of "replacing" traditional tools, but has also played a higher-level role in "modifying" and "reshaping" learning tasks. The interactive field supported by AI can provide a feedback mechanism that combines long-term and short-term. In some specific fields of teaching, students can use AI to obtain real-time feedback and continuously loop through multiple evaluations and modifications to form long-term feedback, overcoming the limitations of traditional evaluation approaches and correction cycles and single-instance feedback.

3. The mechanisms and models of intelligent technology in transforming classroom interaction

The speech recognition technology and educational modeling technology in artificial intelligence have changed the interactive elements such as feedback methods, dialogue content, and practice scenarios in high school Chinese oral classes. They have transformed from traditional teacher feedback, teacher-student or student dialogue practice content, and single oral practice scenarios to new interactive mechanisms and integration models.

3.1. Empowerment mechanism of speech recognition technology in oral interaction

In the high school Chinese oral classroom integrated with artificial intelligence technology, AI language recognition technology transforms students' instantaneous, fuzzy and limited oral expressions into data resources that can be analyzed, providing a basis for teaching decisions and enabling real-time, scalable, and visualized feedback on students' oral practice output. This approach addresses the core problem in traditional high school Chinese oral classes, where teachers cannot simultaneously understand the learning situation of all students. It also helps overcome the difficulty in providing guidance to every student.

In high school Chinese oral classes that use speech recognition technology, teachers can use speech recognition technology to analyze and screen students' oral questions, analyze and respond to content in depth, providing a foundation for subsequent analysis and process review of vocabulary density, logical connection word usage, and other content. Keywords can be extracted from them to

quickly identify students' learning priorities and knowledge gaps, thus achieving teaching design based on students' real learning situations.

In addition to textual analysis of speech transcription, the speech recognition technology of AIGC can also provide real-time quantitative feedback on students' oral pronunciation and fluency. For example, the AI speech recognition system used by Mongolian schools in Tongliao City, Inner Mongolia, in Chinese oral classroom teaching can highlight the words and phrases that students have read incorrectly or missed in red, and provide evaluation scores based on their overall reading performance, so that every student can have equal opportunities for oral practice and feedback. The speech recognition system allows students to independently complete oral reading exercises and obtain feedback on oral fluency and pronunciation, improving the quality and efficiency of oral practice from both practice coverage and timely feedback [10]. The empowerment of speech recognition technology in Chinese oral classes is not only limited to the level of pronunciation, but also enables multidimensional judgment of the emphasis on logical content and emotional expression during oral practice. For example, the "Intelligent Oral Expression Assistance System" developed by National Taiwan University of Science and Technology can provide personalized improvement suggestions based on the difficulty level of the report, key and missing points in oral expression, speaking speed, and emotional expression. To some extent, it has begun to involve the core competency level, but still relies mainly on auxiliary analysis [11]. Most existing speech recognition systems only provide feedback on oral practice at the surface level of speech, and it is still difficult to achieve deep automated evaluation of content, thinking, logical thinking, and cultural literacy, which are important components of oral literacy in the Chinese language curriculum standards. Therefore, the AI speech recognition system should be positioned as an auxiliary diagnostic tool in Chinese oral teaching, complementing teacher evaluation. In the classroom practice process, AI can provide quantifiable and repetitive feedback on speech, basic vocabulary, etc., while teachers focus on qualitative evaluation of students' logical thinking and cultural literacy in oral practice. For example, in specific classroom practice, teachers can accurately locate common difficulties and individual differences based on the reading data table of each student in the system backend, achieve a transition from experiential tutoring to data-targeted tutoring, and ultimately complete the entire process of student practice, AI real-time diagnosis, visualization of data, and precise guidance by teachers [10].

3.2. Empowering mechanism of education model in dialogue and content generation

The core of AI empowerment lies in its infinite content generation capability and flexible dialogue interaction ability. By creating complex learning scenarios and acting as virtual interactive objects, the limitations of time and space in classroom teaching can be broken.

In high school Chinese language teaching, the education model can generate discussion topics based on teaching themes, classroom student performance role scripts, cultivate students' critical thinking abilities, and expand reading materials, enriching teaching resources. In the June 2025 summary of teaching and research in Jiading District, Shanghai, it was pointed out that in high school Chinese language teaching, teachers can use the graphic and text generation function of the educational model to construct texts or historical scenes that are far away from students' daily lives, providing students with a concrete cognitive framework [7]. On November 7-8, 2025, the seminar on "Empowering Chinese Language Teaching with Generative Artificial Intelligence" was successfully held in Huangpu District, Guangzhou. The seminar on "Empowering Chinese Language Teaching with Generative Artificial Intelligence" was held in Huangpu District, Guangzhou.It mentioned that in practice, using educational models to generate cognitive frameworks for learning

situations such as reading the entire book "Rural China" that contain complex concepts such as "ritual order" can, to some extent, alleviate students' difficulties in understanding academic texts [11].

In addition to providing richer teaching resources, AI can also design simulated dialogue scenarios according to classroom needs, play specific roles in the classroom, engage in multiple rounds of in-depth conversations with students, and guide students to engage in in-depth thinking around textual themes and logical arguments. At the seminar presentation, teachers created "AI Study Companions" for students to debate with and engage in "dialogue with text characters" to deepen their thinking training [11]. In the teaching of classical Chinese and other characteristic texts, a "historical character intelligent agent" can be constructed to achieve cross-temporal and cross-spatial dialogue between students and ancient people [2].

The AIGC education model provides structured and guided expression suggestions for students' oral practice. For example, suggestions on structural analysis, logical organization, and language polishing of the oral and written content input by students. For example, the Jiading Teaching and Research Association pointed out that the education model can help students discover problems in vocabulary, thinking logic, and other aspects in essay teaching, and provide personalized essay revision suggestions for each student. It can generate different text examples for students to compare, promote the development of critical thinking and improve their self-evaluation ability [7].

Of course, the educational model of AIGC also has many limitations. For example, the content generated by AI is highly likely to have factual errors and "deviation issues" from values, which requires teachers to rigorously review its application; In addition, Beijing Normal University mentioned in its report on the first evaluation list of the "North Star" Basic Education Model Evaluation Field that the connotations of classical poetry, idioms, and allusions unique to Chinese may be superficial. According to authoritative evaluations, its performance in the core dimensions of education that require "inspiration and guidance" and "literacy orientation" is still not ideal. Especially after the conditions of the problem were rewritten, the problem-solving performance of the model showed a significant decline, exposing its weak logic. If there is excessive dependence on the AI education model, it may weaken students' ability to think independently, and teachers need to be vigilant.

For the role positioning of the education model in high school Chinese language classrooms, it should be positioned as a "collaborative tool", and the key lies in the high-quality prompts and process design of teachers. Educational experts emphasize that teachers should master the rules of instruction design with clear objectives. For example, in the teaching design of "Teacher's Discourse", through multiple rounds of guidance from teachers and collaboration with the education model, the teaching design is deepened from simple thematic discussions to speculative questions with specific logical arguments. The integration process should start with "teachers setting goals and frameworks", followed by the generation of specific materials and situations from the big model, and then be jointly criticized, screened, and deepened by teachers and students, ultimately serving as a students' thinking exercise.

4. Core teaching strategies and case design

Firstly, an effective human-machine collaborative high school Chinese oral teaching should not just be a scattered application of AIGC technology. Effective human-machine collaborative oral teaching should build a closed-loop instructional system centered on student ability development, a data-driven closed-loop system centered on student oral ability development. The core stage of this

closed loop is composed of "input immersion evaluation", and speech recognition and education big model technology operate throughout the entire process, empowering every key teaching stage.

4.1. Strategy framework: a human-computer collaborative oral teaching loop based on "input interaction feedback"

To address the issues of insufficient personalization of teaching resources and lagging diagnosis of learning situations, teachers can use large language models to generate comparative texts or language materials imitating writing styles during the input stage, creating a starting point for classroom thinking and providing students with starting materials for speculative expression around textual viewpoints and positions. The research conducted by Li Yongzhi and others on the construction of a "teaching thinking chain" and the inference process of a visualized education model can guide the model to generate lesson plans and structured materials with clear direction and coherent logic that meet the requirements of classroom teaching, under conditions that are more in line with disciplinary logic and teaching cognitive laws. In the immersion stage, the core value of technology lies in creating highly interactive and low anxiety dialogue situations, guiding students to engage in deep thinking activities, and shifting the classroom from "one-way teaching by teachers" to "multidimensional dialogue" covering teacher-student, vitality, and student interaction [12].

Liu Bangqi et al.'s research suggests that the artificial intelligence education model can play a highly adaptable interactive role in supporting guided exploration and debate by constructing contextualized dialogue engines and cognitive scaffolds under specific teaching themes. This technological path provides a foundation for teachers to systematically design AI as a "critical thinking practice" tool, which can systematically organize logical thinking activities based on the core questions in the text, thereby deepening students' thinking training [13]. Research on the tripartite collaboration of "teacher student machine" has also confirmed that AI can become an "auxiliary partner" for collaborative students' cognitive processes, providing immediate feedback and differentiated support in exploration, while teachers can focus more on the overall design and personalized guidance of learning activities. In text analysis, teachers can guide students to engage in multiple rounds of dialogue with AI, combine background information to deeply analyze the logical behavior of characters, and expand individual cognitive perspectives. Zhang Jian's research further elucidates that this tripartite interactive structure not only breaks the physical and resource limitations of the classroom, expands the forms of meaning negotiation, but also fundamentally promotes the structural reconstruction of the teaching subject from the "teacher student" binary relationship to the "teacher student machine" ternary collaborative relationship [14]. In the evaluation phase, AI technology is committed to achieving a shift from subjective evaluation that focuses on results to data-driven evaluation that focuses on processes, and providing personalized feedback loops. In the process of data collection, the use of intelligent speech systems can collect real-time oral practice data of all students in the class, enabling integrated in-class practice, evaluation, and expression. Zou et al. found through empirical research on artificial intelligence speech automatic evaluation programs that such systems can provide multi-dimensional and refined process analysis for oral learners. Research has shown that this continuous process of data tracking and targeted feedback not only effectively improves learners' oral skills, but also enhances their learning motivation and self-correction awareness, and constructs a dynamic and personalized feedback loop [15]. Research has shown that human-machine collaboration can automatically generate personalized learning feedback reports covering multi-dimensional data [16]. In expression training, AI can undertake preliminary correction of basic elements such as vocabulary and

grammar, while teachers conduct higher-level review and improvement of ideological and creative aspects based on this foundation. By leveraging viewpoint aggregation functions and visual feedback on the intelligent learning platform, a three-dimensional evaluation mechanism can be constructed, and teaching can be adjusted based on real-time data.

4.2. Typical case design: an AI-collaborative evaluation model for high school Chinese debate classes

In the high school Chinese debate course of AI collaborative evaluation, it is necessary to concretize the human-machine collaborative oral teaching loop based on "input immersion evaluation" mentioned above into an operable case, so that it runs through the entire process of the course from beginning to end.

In terms of "teacher machine interaction", teachers can use educational vertical models for intelligent lesson preparation. After determining the topic, the model can generate preliminary arguments, evidence materials, and logical analysis to serve as a pool of instructional resources. At the same time, teachers can publish preview tasks through the learning platform and use AI tools to quickly analyze the argument outlines submitted by students, summarize common questions and thinking tendencies, and accurately design classroom intervention points [17].

In terms of "student-machine interaction", students can use intelligent voice tools to practice essay recording and receive real-time feedback and targeted improvement suggestions on pronunciation, fluency, and other aspects [18].

The relevant teaching reform points out that in intelligent classrooms, AI can not only be a tool, but also be designed as a virtual debater or logical prompter, forming a multidimensional dialogue network with students and teachers. This represents a reconstruction of teaching subjects from binary to "teacher-student machine" ternary collaboration [14].

The implementation of the "man-machine debate exploration method" contributes to the cultivation of higher-order thinking. Research has shown that in AI-supported online argumentative learning, a well-designed interactive environment can generate synergistic effects, significantly improving students' engagement and argumentative quality in cognitive, emotional, and behavioral dimensions [19]. A study on the empowerment of artificial intelligence in the reconstruction of university classroom teaching has also proposed the paths of "human-machine collaborative scene interaction" and "data-driven scene integration" [19]. Although the study focuses on universities, its concept of "data-driven decision-making" is applicable to high school scenarios. Teachers can use real-time transcribed text to generate speech heat maps and data dashboards such as "viewpoint clouds", to gain insights into debate focus transfer and individual performance, and thus carry out precise intervention guidance (i.e. "scene interaction") [20].

5. Review and reconstruction of evaluation indicators for multiple universities' implementation

Schools with different resource endowments exhibit significant differences in promoting human-machine collaborative teaching. Schools with abundant resources are trying to go beyond the application of a single tool and are committed to deeply integrating artificial intelligence into the entire teaching process. Their exploration is often based on a comprehensive technical architecture that can unify the scheduling of content generation, situational interaction, and learning analysis, thus moving towards "ecological integration" [13]. Specifically, some schools have begun to construct immersive text virtual spaces or use large models to design high-level thinking tasks,

guiding students to engage in in-depth conversations with AI on topics such as poetry imagery. This is essentially a reshaping of the overall teaching model based on systematic technological support. The starting point and focus of schools with limited resources are more realistic. They often face long-term challenges such as weak oral teaching foundations and a lack of systematic evaluation [21]. Therefore, their technology application strategies tend to be highly focused, mainly targeting core pain points such as "lack of practice opportunities" and "insufficient immediate feedback", and choosing lightweight and easily accessible universal tools to seek breakthroughs. The common approach is to organize oral training and peer evaluation through widely accessible communication software or public platforms, with the primary goal of ensuring coverage of basic exercises and retaining learning process data. However, due to the lack of professional tools and support, it continues to function primarily as an "assistant" rather than a "reconstructor" in these scenarios, often used to replace specific processes such as automatic grading, making it difficult to achieve a systematic teaching closed-loop design that covers pre-class, in-class, and post-class. For example, although there have been studies exploring the use of large models to assist in the deep analysis of poetic imagery and personalized learning design, the stable implementation of such collaborative teaching that deeply integrates cognitive processes still faces challenges in resource-limited environments [22,23]. The division in application depth and mode innovation caused by resource differences, if it persists for a long time, may exacerbate the "digital divide" between schools through the cumulative effect of teaching quality and learning opportunities, which is an issue that needs special attention in promoting human-machine collaboration.

6. Challenges in reality, existing methods, evaluation indicators, and future improvement directions

6.1. Main challenges encountered and existing coping strategies

The mainstream artificial intelligence models currently used in education are mostly generic models, which face serious adaptation problems in the highly specialized and culturally prominent scenario of high school Chinese oral teaching. For example, AI tools have insufficient accuracy in recognizing the rich tones and emotions in Chinese tones, classical poetry rhythms, and colloquial expressions; The generated teaching content does not align well with the language construction and application literacy goals required by the "General High School Chinese Language Curriculum Standards".

Based on this issue, some artificial intelligence companies have developed "Chinese education-specific speech engines" to improve recognition accuracy in classroom environments to a higher level. However, the operation and maintenance of such specialized engines are typically involve high costs, and their optimization is mostly focused on the level of speech signals. Their ability to understand and evaluate the logical, ideological, and cultural connotations of language content itself is still weak, making it difficult to support deep instructional interaction of deep teaching interaction.

The challenge of teacher professional development is also facing the dilemma of transitioning from a "technology user" to a "collaborative designer" role. Many teachers face a structural lack of intelligent literacy, especially a lack of "collaborative teaching design ability" to deeply integrate AI into the teaching process. Traditional teaching and research often focus on a single tool or demonstration course, making it difficult to form systematic support. It is difficult for the system to support teachers in completing this role transformation. In response to the dilemma of teacher role transformation, the "Teacher AI Collaborative Teaching Design Workshop" widely carried out in various regions has achieved significant results in popularizing the use of tools. But its limitations

lie in its short-term and project-based approach, and it has not been integrated into the teacher's regular professional development system. Once external support is withdrawn, it is difficult for teachers to independently complete the deep integration from design to evaluation. The deeper challenge is that human-machine collaboration may lead to conflicts between teachers' "transfer of leadership" and their own "high-level ability needs".

Some regions have begun to actively explore, for example, Pingxiang City has attempted to integrate "top-level design, regional experience, and practical wisdom" through cross-level collaboration by combining "city county school" three-level teaching and research personnel teams, providing more practical support for teachers [24].

Unequal distribution of urban and rural resources and lack of system support are the biggest and most severe problems that human-machine collaboration must face. The depth of human-machine collaboration is highly correlated with the abundance of school resources, and there is a risk of exacerbating the 'digital divide'. Schools with limited resources often only have basic tool-based applications and lack the conditions to carry out deep mode innovation. In addition, there is a general lack of ethical norms and effectiveness evaluation standards, resulting in a lack of safety guarantees and scientific guidance for practical exploration. In response to such issues, some projects have attempted to deploy "lightweight voice tools+offline large models" for selected pilot rural schools to enhance students' interest and practice frequency. However, the limitations of these "lightweight" and "offline" collaborations often come at the cost of sacrificing functional depth and lacking systematic teacher training and course resources that are compatible with the tools. The applications are easily superficial and unsustainable.

6.2. Review and reconstruction of evaluation indicators

The existing evaluation system generally suffers from problems such as emphasizing form over connotation, emphasizing conclusion over process, and emphasizing technology over humanities. Even before the popularization of intelligent technology, research has pointed out that there are structural problems in the evaluation of middle school oral communication teaching, such as vague standards and single methods, and the final evaluation is often dominated by summative teacher scoring. After the intervention of technology, this problem has not been eradicated and may instead be simplified as a quantification of technology usage behavior.

Traditional evaluations often focus on the final oral outcomes, lacking effective observation and evaluation tools for the thinking processes of negotiation, argumentation, logical evolution, and emotional participation of students in interactions. Currently, AI in oral evaluation tends to concentrate on surface-level features that are easy to quantify, such as pronunciation and fluency. However, the accuracy and reliability of its evaluation are still insufficient in terms of dimensions such as ideological content, logical rigor, and cultural fit. If individuals overly rely on AI scoring, it will further reinforce the one-sidedness of the evaluation.

The new evaluation indicators include three dimensions: interaction quality, learning effectiveness, and human-machine collaboration. The interactive quality indicator focuses on the quality of "relationships" and "thinking" in the teaching process. One is the accuracy of teacher feedback. Teachers in Jiading District use AI to analyze student problems and implement the practice of "teaching design based on learning situations", which reflects the improvement of feedback accuracy driven by data. The quality evaluation of thinking is reflected in the complexity of students' language and the depth of dialogue. In the case of Nanshan District, students engaged in multiple rounds of debates with AI "speculative sparring" on the logic of "Love for All". Students

from Zichuan Middle School designed complex prompt word chains to generate literary scenes, which directly promoted the complexity of language use and the depth of dialogue thinking.

The indicators of learning effectiveness include oral fluency, logical content, and students' confidence in expression, which focus on the enhancement of students' core abilities. Among them, oral fluency and logical content are the focus of traditional oral evaluation. However, with technical support, these indicators can obtain more refined data evidence through pre- and post-test comparisons, such as quantifying changes in fluency through speech analysis software. In addition, blended learning can utilize AI one-on-one exercises, peer evaluations, and other technologies to create a low anxiety environment, which can help enhance students' willingness to express themselves and confidence. The "human-machine collaboration index" is the key to evaluating the health of new models. For example, teaching and research experts in Jiading District, Shanghai emphasized that evaluation technology should serve the achievement of core teaching goals and be wary of increasing learning burden by "using for the sake of use". The appropriateness of teacher intervention timing is also a key aspect that should be focused on in this indicator. Experts in Nanshan District believe that the evaluation key lies in whether teachers have undergone necessary value guidance, thinking sublimation, emotional motivation, and successful role transformation after AI provides information.

6.3. Systematic thinking on future improvement directions

In order to address the "three major challenges" faced by human-machine collaboration and solve pain points, the following three suggestions are proposed.

Firstly, it is necessary to develop subject-specific intelligent agents based on the characteristics of the discipline, which can help improve the responsiveness of technology to the real needs of oral teaching and promote the transformation of technology into "teaching wisdom". It is recommended to promote industry-university-research collaboration and develop a specialized intelligent agent for high school Chinese language teaching. Its research and development must go beyond simple speech or text processing, deeply integrate curriculum standards and core competency goals such as language construction and application, thinking development and enhancement, aesthetic appreciation and creation, and cultural inheritance and understanding. This type of intelligent agent should be integrated into the developmental framework of "language construction and application", and be able to understand and evaluate the logical structure, rhetorical use, and cultural cultivation in students' oral expression. For example, when evaluating a debate about the characters in "Dream of the Red Chamber", the intelligent agent can not only transcribe the speech, but also recognize whether students have used appreciation methods such as "comparison" and "contrast". The evaluation logic should originate from the professional system of Chinese language teaching, rather than general algorithms.

Secondly, a "collaborative lesson preparation community" should be established to continuously communicate and jointly improve collaborative teaching design, achieving the normalization and institutionalization of teacher development. For example, drawing on regional teaching and research innovation experiences such as "three-level linkage" and "circular symbiosis", a normalized "teacher teaching and research group technical consultant" collaborative lesson preparation mechanism can be established at both the school and regional levels [24]. The goal of this mechanism is to jointly develop and continuously iterate the "Typical Lesson Case Library for Human Computer Collaborative Oral Teaching". Each lesson example should fully include: teaching objectives, AI tools and role design, teacher-student activity process, human-machine division of labor nodes, and effectiveness evaluation plan. This can transform individual teacher explorations into shareable and

modifiable collective wisdom, reducing the practical difficulty of each teacher in technology selection and classroom design.

Finally, in order to establish ethical and evaluation standards and to guide responsible and evidence-based practice, it is necessary to clarify the protection of data privacy, transparency review of algorithms, and the principle of human-centeredness. Special attention should be paid to the prevention of algorithmic bias and the potential limitations of "information cocoons" on students' thinking.

On this basis, it is necessary to establish a multidimensional evaluation model that goes beyond the "duration of use". The model should cover at least multiple dimensions, including teaching effectiveness (such as the enhancement of students' oral proficiency), student participation (cognitive, behavioral, emotional engagement), and teaching innovation (originality of the model). Through scientific evaluation, guide practice to shift from pursuing pure "technological display" to focusing on "educational effectiveness".

7. Conclusion

7.1. Research summary

The empowerment of intelligent technology in high school Chinese oral teaching is a profound reconstruction of teaching relationships. It promotes the transformation of teaching subjects from a binary structure of "teacher student" to a new learning community of "teacher student AI" tripartite collaboration. This kind of reconstruction is summarized in the practice of Beijing No.12 Middle School as follows: teachers become guides and task designers, AI becomes personalized "auxiliary partners" or "precision learning assistants", and students transform from listeners to active participants and constructors. Its goal is to address longstanding limitations in traditional classroom interaction of traditional classroom interaction and shallow experience through relationship restructuring.

Secondly, an effective integration model follows the collaborative principle of "teacher-led design, AI-supported training, and student-initiated construction". Looking at the successful practices summarized in the main section, human-machine collaboration does not aim to replace teachers with technology, but rather to form a collaborative paradigm with a clear division of labor and complementary advantages in cooperation with teachers. The advantages of AI models lie in their capacity to provide large-scale and real-time data feedback and resource generation, while the core values of teachers are reflected in high-level thinking guidance, emotional care, and creative teaching design. For example, in oral training, AI can accurately analyze the intonation and emotions of reading aloud, and undertake basic training tasks; In critical thinking teaching, AI can serve as a tool for students' critical thinking training or situational generation. But the design of the entire teaching process, the control of values, and the promotion of learning depth always require teachers to play a leading role.

The cultivation of the core literacy of "language construction and application" in the ultimate goal of Chinese language core literacy is the fundamental criterion for evaluating collaborative effectiveness. No matter how technology evolves, its ultimate goal must serve the core literacy of the Chinese language discipline. In the field of oral communication, it is to promote students to achieve standardized and aesthetically pleasing oral expression in real contexts, and to develop their critical thinking and deep communication skills. The current exploration emphasizes the integration of technology and disciplinary objectives. Closely focused on this goal. For example, by designing "human-machine debate exploration" to train logic, or using generative AI to assist students in

completing the complete process of "question asking," "viewpoint establishment," and "discourse organization. This indicates that AI-integrated instructional design is being developed around the ability goals of the Chinese language subject itself.

7.2. Inspiration and future directions

Based on the achievements, models, and challenges summarized in the review, propose specific and feasible future development directions:

Firstly, for relevant artificial intelligence enterprises, a critical direction is the development of subject-specific intelligent agents with "low technological barriers and high teaching adaptability" to promote technology inclusiveness and deep application. There is a gap between the current general tools and the depth of teaching requirements. Future research and development need to focus on vertical domain educational intelligent agents that deeply integrate Chinese language curriculum standards, Chinese language characteristics, and oral teaching rules. Such tools should be able to understand and evaluate the logical structure, rhetorical use, and cultural connotations in oral expression, promoting the transformation of Chinese language learning agents from "general intelligence" to "disciplinary intelligence".

Secondly, the system examines the long-term impact of different collaborative modes on oral proficiency and constructs an "evidence-based improvement" scientific practice loop. Currently, a large number of practices are described as case studies, lacking rigorous empirical evidence. In the future, it is urgent to carry out "long-term teaching experimental research" to compare the long-term effects of different human-machine collaboration modes on students' oral expression ability, critical thinking, learning engagement, and other aspects in schools with different resource configurations.

Finally, the present study will focus on building a collaborative innovation ecosystem involving multiple stakeholders, achieving an upgrade from "teacher training" to "ecological co-construction". Teachers' challenges require systematic support. Moving forward, it is essential to move beyond the short-term "workshop" model and build a "normalized collaborative lesson preparation and research and development mechanism" that includes teaching and research personnel, subject experts, and technology developers. By jointly building a reusable and iterative "typical teaching case library" and school-based resources, individuals can transform excellent practices into collective wisdom. Promote human-machine collaboration from a "demonstration course" to a "regular course".

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