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Exploration of the Collaboration between Artificial Intelligence and Human Intelligence in Foreign Language Education

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Abstract: *In today's rapidly developing digital era, the field of foreign language education is undergoing profound changes, with the synergistic effect of artificial intelligence (AI) and human intelligence (HI) becoming a highly anticipated focus. This article explores the collaboration between artificial intelligence (AI), human intelligence (HI) in foreign language education. By the collaboration between AI and HI in the development of teaching resources and customized service, AI has powerful data processing and analysis capabilities, which can quickly screen and integrate massive amounts of foreign language learning materials. HI, on the other hand, relies on the rich teaching experience of teachers and their keen insight into individual students, and collaborates with AI to tailor highly suitable learning materials for students. Additionally, the collaborative innovation of teaching evaluation based on learning analysis technology has achieved the comprehensiveness, objectivity, and scientificity of teaching evaluation. Furthermore, the collaborative innovation of curriculum design and teaching activities has continuously enriched the forms and contents of foreign language teaching, enhancing students' learning experience. Notably, AI and HI are not interchangeable, but complementary, injecting new vitality into foreign language teaching through various collaborative methods.*

Keywords: *Artificial Intelligence (AI), Human Intelligence (HI), Collaboration, Foreign Language Education*

1. Introduction

At present, AI technology is entering the higher education field as a "collaborator", transforming the elements of university education and teaching, while also reconstructing the entire university education and teaching ecosystem[1]. With the rapid development of technology, the application of artificial intelligence (AI) in foreign language education is becoming increasingly widespread. From the early simple voice recognition to assist pronunciation practice, to today's intelligent essay correction, personalized learning path planning and immersive language learning environment creation through natural language processing technology, AI technology has permeated all aspects of foreign language education, bringing many new possibilities and transformation opportunities to traditional foreign language education.

At the same time, the crucial role of human intelligence (HI) in foreign language education cannot be ignored. “Language is a cognitive practice rooted in the soil of social culture” [2]. The process of its acquisition is far from being a simple symbol mapping or pattern training.The content provided by artificial intelligence represented by AI comes quickly, and learners forget it quickly. It cannot be fixed in the learner's brain. In contrast, human foreign language teachers have the ability to comprehensively use the essence of different second language acquisition schools [3]. They understand both the cognitive requirements for individual deep processing and the phased needs for language skill development [3]. Teachers and learners attach great importance to the utilization of various external environmental factors by social and cultural parties, and focus on the repeated practice of covering various connection patterns based on the use oriented approach. HI endows learners with the ability to deeply understand the cultural connotations behind language, enabling them to not only mechanically memorize vocabulary and grammar when exposed to foreign languages, but also to deeply explore the social customs, values, and ways of thinking carried by language.

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The future of foreign language education should be the collaborative construction of a "dual subject cognitive model" between AI and HI: AI undertakes standardized and data intensive cognitive labor, while teachers focus on high-level teaching tasks that requires cultural insight, ethical judgment, and creative thinking. David Kennedy, Dean of Digital Education, Newcastle University said, “We are committed to the critical, ethical and responsible use of generative AI tools and to preparing our students and colleagues to work effectively in an increasingly AI-enabled world.”

2. The Collaboration between AI and HI

Against the backdrop of profound changes in the global education ecosystem and the deep integration of information technology into the education field, foreign language education, as a key area for cultivating international talents, is facing unprecedented opportunities and challenges. AI is no longer just an external "tool" or an external resource manipulated by learners, but should transcend the binary opposition between subject and object and become an important component of the entire learning ecosystem [4]. Important constituent elements AI and HI are not isolated from each other, but rather complement and deeply integrate each other to construct a new paradigm of foreign language teaching, providing a strong source of motivation for improving teaching quality and promoting students’ comprehensive development. This collaborative model not only conforms to the trend of educational modernization, but also serves as the core path to meet the diverse learning needs of students and promote innovative development in foreign language education.Teaching facilities and equipment based on AI technology will become indispensable partners for college students' learning[5].

2.1. The Collaboration in Development of Teaching Resources and Customized Services

The quality and adaptability of teaching resources directly affect the effectiveness of foreign language teaching. AI, with its powerful algorithms and data mining capabilities, can conduct in-depth analysis and integration of massive foreign language learning resources. For example, by mining foreign literature, academic lectures, language learning forums and other multi-source data on the Internet, AI can screen high-quality content that meets specific teaching objectives, language proficiency and interest fields. Meanwhile, utilizing natural language processing technology, AI can intelligently annotate and classify these resources, laying the foundation for personalized recommendations in the future.

For example, with the help of web crawling technology, AI can access internationally renowned academic databases such as EBSCO host JSTOR, professional language learning platforms such as Duolingo, Rosetta Stone, and academic lecture video websites, such as TED Talks and Coursera, comprehensively collect and deeply mine heterogeneous data from multiple sources. By utilizing technologies such as text classification, sentiment analysis, and semantic annotation in the field of natural language processing (NLP), AI can accurately screen high-quality knowledge content that aligns with specific teaching objectives, students' language proficiency, and interests and preferences. Taking students preparing for the IELTS exam as an example, AI can filter out targeted resources from a massive amount of data, including detailed analysis of IELTS exam questions, in-depth analysis of high scoring oral examples, and comparative analysis of writing templates and model essays; For students who have a strong interest in British literature, AI can excavate rich materials such as electronic original works of classic British literature, in-depth interpretations of the author's life stories, and cutting-edge literary criticism papers.

Teachers participate in the customized development of teaching resources based on their teaching experience and in-depth understanding of students. Teachers can propose resource customization requirements to the AI system based on the curriculum outline and students' actual needs, such as specialized practice resources for a specific grammar point, reading materials for a specific topic, etc. AI quickly generates customized teaching resource packages based on the needs of teachers, including practice questions, instructional videos, and expanded reading materials. In addition, teachers can also review and optimize AI generated resources to ensure their accuracy, moderate difficulty, and alignment with teaching objectives. Through this collaborative approach, highly personalized and precisely adapted teaching resources can be provided to students, meeting the diverse learning needs of different students.

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2.2. Collaborative Innovation of Curriculum Design and Teaching Activities

The continuous innovation of curriculum design and teaching activities is the core driving force for improving the quality of foreign language education and cultivating students' core competencies. Guided by educational innovation theory, instructional design theory, and constructivist learning theory, AI provides a scientific reference for curriculum design based on big data analysis and intelligent algorithms. Through in-depth analysis of massive foreign language teaching case libraries, student learning behavior databases, cutting-edge research achievements in the field of education, and international education standards and trends, AI can use data mining technology and machine learning algorithms to provide teachers with course content optimization suggestions, teaching method selection references, and teaching activity design inspiration.

For example, based on Piaget's cognitive development theory, Vygotsky's zone of proximal development theory, and the theory of multiple intelligences, AI can recommend personalized course content and teaching methods combinations according to the characteristics of students in different age groups, learning levels, and learning goals. For learners in the primary cognitive stage, AI recommends basic courses led by situational teaching method and direct method. By creating real language situations, such as daily life scenario simulation and simple story telling, it helps students establish the connection between language and situation, promote the natural acquisition of language knowledge, and pay attention to the cultivation of listening and speaking skills to stimulate students' interest in learning; For advanced learners, AI suggests adopting project-based learning and inquiry based learning as the main extension courses, encouraging students to comprehensively apply language knowledge and skills in solving practical problems, such as conducting cross-cultural research projects, academic paper writing, etc., to cultivate critical thinking, innovation ability, and self-learning ability.

Teachers play an irreplaceable leading role in curriculum design and innovative teaching activities. Teachers combine the suggestions provided by AI with their own advanced teaching concepts, and design innovative and effective curriculum systems and teaching activities based on constructivist learning theory, situational cognition theory, and cooperative learning theory. Teachers can use AI technology, such as virtual reality (VR), augmented reality (AR), intelligent interactive platforms, intelligent teaching software, etc., to create diverse, immersive, and interactive teaching activities.Teachers can monitor students' learning behavior and status in real time, adjust teaching strategies in a timely manner based on learning analysis data, such as adjusting activity difficulty, changing grouping methods, providing personalized guidance, etc., to ensure the smooth progress of teaching activities and achieve expected teaching goals.

The collaborative innovation model based on educational innovation theory and instructional design theory continuously enriches the form and content of foreign language teaching, enhances students' learning experience and effectiveness, lays a solid foundation for cultivating foreign language talents with international vision, innovation ability, and cross-cultural communication ability, and helps foreign language education achieve high-quality development in the context of the new era.

2.3. Collaborative Innovation in Teaching Evaluation Based on Learning Analysis Technology

With the rapid development of AI technology and its wide application in classroom teaching, the traditional classroom evaluation model can no longer meet nowadays needs. The relevant evaluation methods integrated withartificial intelligence still have problems such as accuracy deviation and single evaluation content. Therefore, it is urgent to carryout human-computer collaboration and promote the development of classroom teaching evaluation to the direction of intelligence[6]. Teachers need to actively use AI and make good use of its advantages as an evaluation assistant, and to improve their own evaluation literacy, especially in complex dimensions such as evaluation logic and structure[7]. Teaching evaluation is a key feedback link in the closed loop of foreign language education, which plays an irreplaceable role in accurately evaluating teaching effectiveness, optimizing teaching strategies, and promoting students' learning and development. In the current era of booming development of education big data and learning analysis technology, AI relies on multi modal data collection and analysis technology to deeply mine, extract features, and model and analyze multi-source data of students in the learning process. These data cover learning behavior data, such as online learning duration, learning path trajectory, which records students' click order and dwell time on the learning platform, frequency and depth of participation in discussions, evaluates students' speech content, response frequency, and mouse click behavior through analysis, and is used to determine students' attention focus and interest points; Learning outcome data, such as homework scores, exam scores, project completion quality, are evaluated from multiple aspects such as content completeness,

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innovation, language expression, as well as oral test performance. Speech recognition technology is used to analyze pronunciation, fluency, etc; And emotional data, such as determining students' focus, interest, confusion, etc. based on facial expression recognition, identifying students' emotional states such as excitement and frustration through speech intonation analysis, and monitoring physiological indicators such as heart rate and skin conductance response to measure students' learning stress levels.

By using deep learning algorithms such as convolutional neural networks, recurrent neural networks, data mining techniques such as association rule mining, clustering analysis, and machine learning models such as support vector machines and decision trees to analyze and process this data, AI can construct a comprehensive, dynamic, and visual learning portrait for each student, accurately evaluating their learning progress and ability level from multiple dimensions such as knowledge mastery, skill development, emotional attitude, and learning style. For example, by analyzing students' answer data on online learning platforms, AI can accurately determine their mastery of different grammar points, vocabulary, as well as their strengths and weaknesses in listening, reading, writing, speaking and other skills; Through facial expression recognition technology, AI can monitor students' concentration, interest, and confusion in class in real time, providing scientific references for teachers to adjust teaching pace and methods.

Teachers form a close collaborative relationship with AI in the process of teaching evaluation. On the one hand, teachers use students' learning profiles, based on educational psychology, teaching diagnosis theory, and learning motivation theory, to conduct comprehensive and in-depth analysis of students' learning situations. Teachers can accurately identify the bottlenecks that students encounter in the learning process, such as misunderstandings in knowledge comprehension, incorrect understanding of subjunctive mood, stagnation points in skill improvement, confusion in logical structure in writing, and potential risks, such as decreased interest in learning, decreased participation, reduced learning duration, lack of learning motivation, and lack of proactive learning behavior, and timely adopt targeted intervention strategies. For example, for students with decreased interest in learning, teachers can use motivation theory to design interesting teaching activities, such as English movie dubbing competitions, English drama performances, etc., to reignite students' learning enthusiasm; Teachers can conduct specialized writing training and provide one-on-one guidance to address logical writing issues.

On the other hand, teachers supplement and revise the evaluation results generated by AI based on their profound teaching experience, professional judgment, and comprehensive understanding of students. Taking the evaluation of students' oral expression ability as an example, AI can use speech recognition technology and language models to quantitatively evaluate the accuracy of speech intonation, richness of vocabulary usage, grammatical correctness, speed, and other dimensions; Teachers evaluate from more subjective and situational dimensions such as language fluency, logical expression, flexibility in using communication strategies, and appropriateness of emotional expression. The two complement and verify each other, shifting teaching evaluation from a single dimension to multiple dimensions, from static evaluation to dynamic tracking, from subjective judgment to the integration of subjectivity and objectivity, achieving the comprehensiveness, objectivity, and scientificalness of teaching evaluation.

In addition, teachers can use the evaluation data provided by AI, apply teaching reflection theory, trace the teaching process, and comprehensively reflect and optimize from the aspects of teaching goal setting, teaching content selection, teaching method application, and teaching activity organization. For example, if AI data shows that students have poor vocabulary mastery in a certain unit, teachers can reflect on whether their AI has limitations in language processing technology. The current language processing models are difficult to accurately understand semantically complex and culturally profound foreign language content. When faced with texts rich in metaphors and cultural allusions, such as poetry and literary works, artificial intelligence often experiences misunderstandings and provides incorrect or incomplete interpretations. This may affect students' accurate acquisition of knowledge and mislead their understanding of language. At the same time, the quality of training data directly affects the performance of artificial intelligence. If there is bias or incorrect labeling in the data, it can lead to errors in the learning resources generated based on this data, thereby misleading students. For example, if there are incorrect translation pairs in the translation data, students will learn incorrect expressions during learning.

3. Challenges and Coping Strategies of the Collaboration between AI and HI

In the era of rapid development of AI, integrating it into foreign language education and collaborating with HI, although promising, also faces many challenges that require targeted strategies

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to address.At present, the development speed of artificial intelligence far exceeds the formulation of national regulatory frameworks and the readiness of foreign language teachers for new technologies[8].

3.1. Technical Challenges and Strategies

There are significant technological challenges in the application of artificial intelligence in foreign language education. Data privacy and security risks are prominent. When collecting and analyzing student learning data, artificial intelligence involves the storage and use of a large amount of sensitive data such as personal information, study habits, and academic performance. Once these data are leaked, students' privacy rights will be violated, and their learning and life may also be negatively affected. Algorithmic bias is also an issue that cannot be ignored. AI algorithms are trained on a large amount of historical data. If there are biases in the data, such as uneven proportions of data based on certain cultural backgrounds, genders, or regions, the algorithm may have biases in resource recommendations, learning evaluations, and other aspects, and cannot provide fair learning support for all students. To address these challenges, it is necessary to strengthen data security protection by strengthening data privacy protection legislation, clarifying the norms and boundaries of data collection, storage, use, and sharing, and using encryption technology, access control, and other means to ensure data security. At the same time, this study optimizes the fairness of the algorithm, introduces a multi-party supervision mechanism in the process of algorithm development, uses diversified and balanced data for training, regularly evaluates and optimizes the fairness of the algorithm, and reduces the algorithm bias.

3.2 Challenges and Strategies at the Teacher Capability Level

As the direct implementers of foreign language teaching, teachers' abilities directly affect the effectiveness of collaborative teaching. Many teachers, although possessing solid knowledge of foreign languages and rich teaching experience, have shortcomings in information technology application ability, making it difficult to proficiently use artificial intelligence tools for teaching resource development, learning data analysis, and other work. And when faced with the large amount of data and analysis results provided by artificial intelligence, teachers lack effective data interpretation and application abilities, unable to transform these data into practical and feasible teaching decisions, which affects the effectiveness of collaborative teaching. To enhance teachers' abilities, schools and educational institutions should carry out targeted teacher training programs, covering information technology applications, data analysis, artificial intelligence education applications, etc., to help teachers master the skills of using artificial intelligence tools and improve their data interpretation and application abilities. In addition, it is crucial to establish a platform for teacher communication and cooperation, which can promote teachers to share their experience and insights in AI assisted teaching, explore innovative teaching methods together, and create a good learning and development atmosphere.

Learners cannot rely solely on guidance from teachers or stronger peers, but need to unleash more initiative and autonomy in order to effectively utilize generative artificial intelligence. This puts forward higher requirements for foreign language teachers and foreign language teaching, requiring teachers to guide students to fully utilize their autonomous learning abilities and collaborate with AI in teaching[9]. By adopting the above strategies to address challenges at different levels, we will gradually overcome the difficulties in collaborative practice and promote the deep integration and collaborative development of AI and HI in foreign language education.

4. Conclusions

In the process of AI and HI collaborative practice, we inevitably face a series of challenges. From an ethical perspective, machines lack emotions and flexibility, which results in a lack of attention to human rights, emotions, morality, educational fairness, and educational responsibility during their interaction with students[10]. The issues of data privacy and security at the technical level, algorithmic bias, constraints of traditional educational concepts and insufficient policy support, as well as the lack of information technology application and data interpretation abilities among teachers, all hinder the deep development of collaboration to a certain extent. But by strengthening data security protection, optimizing algorithms, innovating educational concepts, increasing policy support, and conducting teacher training, we are confident in gradually overcoming these difficulties.

AI and HI are not interchangeable, but complementary, injecting new vitality into foreign language teaching through various collaborative methods. Foreign language educators should actively embrace

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AI technology, integrating it organically into the existing educational system to produce high-quality outcomes and elevate foreign language education to new heights of reform [3]. With the continuous advancement of artificial intelligence technology and the continuous updating of educational concepts, the deep integration of AI and HI in foreign language education is expected to further break the limitations of traditional foreign language teaching, build a more personalized, efficient, and intelligent new ecology of foreign language education, lay a solid foundation for cultivating high-quality foreign language talents with global vision, cross-cultural communication ability, and innovative thinking. It's important to grasp the development strategy of innovative talents driven by the intelligent era, focus on the key elements of education innovation driven by AI, reshape the blueprint of future education ecology boosted by artificial intelligence, so as to create a high-quality artificial intelligence education new ecology in China[11].

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