Generative Artificial Intelligence Empowering Foreign Language Education and Teaching Reform: Mechanism, Risk, and Response

Juan Bai*

Beijing International Studies University, Beijing 100024, China

Corresponding author: Juan Bai, bjzzl@163.com

Abstract: The rapid development of generative artificial intelligence (GenAI) is profoundly changing the form and paradigm of foreign language education. GenAI technology, represented by DeepSeek, provides technical support for personalization, immersion, and intelligence of foreign language teaching by virtue of its natural language processing, multimodal content generation, and cross-cultural simulation capabilities. From the three dimensions of "teaching reconstruction," "learning innovation," and "education upgrading," this paper systematically analyzes the internal mechanism of GenAI empowering foreign language education and reveals its unique value in language knowledge transmission, skill training, and cultural understanding. At the same time, considering that GenAI may lead to language model errors in foreign language education, cultural misinterpretations, technological dependence, and data privacy risks, it is proposed to adopt coping strategies such as building an advanced literacy system, establishing a human-AI collaborative ecosystem, and implementing a transparent regulatory framework for algorithms. These measures aim to ensure the high-quality development of technology-integrated foreign language education, providing both theoretical support and practical pathways for cultivating globally competent talents with intercultural communication skills and digital literacy.

Keywords: Generative artificial intelligence; Foreign language education; Language skills; Intercultural communication; Technology risk

1. Introduction

In recent years, generative artificial intelligence (GenAI) technology has made remarkable progress and is revolutionizing the global education landscape. As an important field in cultivating intercultural communication competence, foreign language education is of great significance for promoting national cultural confidence and cultivating international communication talents. However, for a long time, foreign language teaching has been facing challenges such as static teaching content, one-way learning methods, and superficial cultural

understanding. Traditional teaching methods are difficult to meet learners' needs for personalized language practice, instant interactive feedback, and in-depth cultural experience [1]. Artificial intelligence technology represented by DeepSeek provides new ideas for solving the problems in foreign language teaching by constructing dynamic knowledge networks, realizing multi-modal interaction, and strengthening reasoning ability. DeepSeek technology can simulate the actual dialogue situation, design customized exercises in line with learners' language ability, and use a visual thinking chain to help grammar analysis, which effectively improves the teaching effect.

However, existing studies mostly focus on the application of GenAI in general educational scenarios, and less in-depth discussion on its special impact on foreign language education. Foreign language education involves a complex process of language skill acquisition, cultural cognitive construction, and communication competence cultivation. The application of GenAI should take into account both technical adaptability and educational humanism, so as to promote learners' mastery and understanding of language and culture. Mechanism of the present study has the following deficiencies: first, analysis of the lack of pertinence, not the combination of foreign language teaching and language acquisition law (e.g., the input hypothesis, communicative teaching method). Second, risk identification does not highlight the particularity of foreign language education, such as the reinforcement of grammatical errors in language models and the spread of cultural stereotypes. Third, the coping strategies fail to integrate the linguistic theory and the technological governance framework. Based on this, this paper systematically analyzed the internal mechanism, potential risks, and governance paths of generative artificial intelligence empowering foreign language education, so as to provide a theoretical reference for the transformation of foreign language education in the era of intelligence.

2. The internal mechanism of GenAI empowering foreign language education

Generative AI reconstructs the ecological chain of "teaching-learning-education" in foreign language education through the closed-loop mechanism of "content generation-scene interaction-cognitive iteration." This closed-loop mechanism of "perception-decision-reconstruction" not only improves the accuracy of language input and the practicality of output, but also promotes the reform of talent training mode through technical tools [2]. It promotes the transformation of the education paradigm from experience-driven to empirical-driven.

2.1. Teaching reconstruction: From standardized mode to personalized language training
2.1.1. Dynamic adaptation of teaching content
The traditional teaching model, which relies on standardized materials, a unified teaching plan, and a fixed outline to guide instruction, allows teachers to provide differentiated feedback and guidance to learners at various levels. However, due to constraints such as rigid teaching schedules and other institutional factors, the implementation of truly personalized teaching strategies for individual learners remains far from fully realized. In contrast, GenAI can dynamically schedule language skill modules (such as grammar parsing, pronunciation correction, vocabulary expansion) through the MoE (Mixture-of-Experts) architecture to achieve the accurate adaptation of teaching content. In French, for example, DeepSeek can detect real-time syntax errors in analytical writing, based on language model generation error correction advice. For those with weak spoken language, DeepSeek provides pronunciation demonstration and automatic pronunciation correction by combining speech recognition and speech synthesis technology. This dynamic adaptation breaks through the fixed content framework of traditional teaching and makes it possible to teach students in accordance with their aptitude. Based on the data statistics and intelligent feedback technology, DeepSeek can also, according to the learner's

progress speed and point of interest, adjust the difficulty of teaching contents and depth in real time, to ensure that every learner can get the best learning experience at their own pace.

2.1.2. Ternary synergy in teaching mode

The traditional classroom takes "teacher-learner" as the core of the dual structure. In the era of artificial intelligence, the "Teacher-AI-Student" Triadic Collaboration Model integrates the advantages of teachers, AI, and learners. AI is introduced as an intelligent agent to form a dynamic collaborative teaching-learner system. Its core goal is to enhance teachers' teaching effectiveness, reduce repetitive work burden, and improve the quality of teaching design. Optimizing learners' learning experience and providing personalized and immediate feedback interactive environment. The technical advantages of AI were used to provide accurate support in knowledge transfer, training enhancement, and learning situation analysis. Under the "teacher-machine-student" collaborative framework, GenAI plays the role of virtual language tutor, and teachers can automatically generate cross-cultural dialogue scripts and design task-based teaching activities with the help of artificial intelligence technology. Learners can get immediate feedback through multiple rounds of interaction [3]. This model not only improves the interactivity of the classroom but also enables teachers to focus more on the individual needs of learners, so as to achieve more accurate teaching.

2.1.3. Multi-dimensional deepening of teaching evaluation

Teaching evaluation is an important link to improve teaching quality, promoting the development of learners' learning. GenAI, using technologies such as natural language processing and large data, can achieve the language ability of multidimensional evaluation. In terms of teaching evaluation, based on natural language processing and machine learning technology, GenAI can better achieve subjective essay scoring and give learners personalized feedback. For example, in foreign language writing assessment, DeepSeek can target vocabulary richness—not only increasing word variety and accuracy, but also enhancing grammatical precision. It can further analyze sentence fluency, logical coherence, topic relevance, native-like expression, and creative aspects of writing. On one hand, this significantly reduces the workload of teachers. In addition, DeepSeek can also provide teachers with comprehensive evaluation reports covering language form and communication function. The diversity of teaching evaluation can not only help teachers to fully understand learners' learning status and adjust teaching strategies in time, but also stimulate learners' learning enthusiasm and provide a basis for setting learning goals and adjusting learning strategies.

2.2. Learning innovation: From passive input to immersive language practice

2.2.1. Construction of multimodal immersive environment

Generative artificial intelligence integrates text, speech, video, and virtual reality (VR) technologies to construct highly simulated language usage scenarios and provide immersive learning experiences for foreign language learners. Taking Spanish teaching as an example, GenAI is able to generate a simulated Spanish market scenario based on a 3D virtual environment, in which learners can engage in bargaining interactions with virtual vendors. This interaction not only trains learners' listening comprehension and oral expression skills, but also enables learners to learn cultural taboos in practice, such as social distancing norms in Latin American countries. The application of an immersive learning environment greatly improves the interest in learning, enhances the practical application ability of learners, and enables them to use the language knowledge they have learned in a real context.

2.2.2. Design of an autonomous learning path

Based on the reinforcement learning algorithm, GenAI can plan personalized learning paths for foreign language learners. By analyzing learners' learning behavior data, such as learning duration, answer accuracy, and frequency of visits to different knowledge points, GenAI can customize the learning plan for each learner. For beginners of Japanese, GenAI can provide kana reading exercises to help them lay the foundation; and for advanced learners, they can enter the advanced practice of "news listening translation-opinion debate" to improve learners' language ability through practical language application tasks. The system will dynamically adjust the difficulty of learning tasks according to the learner's completion degree to ensure that learners are always at a moderate challenge level, so as to make continuous progress at their own pace [4].

2.2.3. Visual feedback on learning effectiveness

GenAI converts the growth trajectory of language ability into a visual graph to provide intuitive learning effect feedback for learners and teachers. For example, for German learners, DeepSeek can present indicators such as "grammar mastery" and "communicative fluency" in the form of dynamic dashboards. This visual map not only gives learners an intuitive sense of their progress but also helps them locate weak areas so that they can optimize their learning strategies. At the same time, teachers can track learners' learning progress more effectively through these visualization tools, find the problems encountered by learners in the learning process in time, and provide targeted help. The feedback mechanism of learning effect visualization not only improved the transparency of learning but also enhanced learners' learning motivation, so that they could participate in the learning process more actively.

2.3. Educational upgrade: From language skills to cross-cultural literacy
2.3.1. Cultivation of cross-cultural cognitive ability

GenAI helps learners understand cultural differences and cultivate cross-cultural cognitive ability through scenario simulation technology. For example, in the teaching of English Business Negotiation, GenAI can generate comparative cases of Chinese and American business negotiations to analyze the cultural conflicts between the two sides in terms of directness and time concept. Through this scenario simulation, learners can intuitively feel the ways of business communication under different cultural backgrounds, so as to improve their cultural sensitivity. This intercultural learning experience helps learners better understand and respect different cultures in the context of globalization, and improve their intercultural communication ability.

In the process of foreign language teaching, intercultural training is an important training goal. In the process of foreign language teaching, GenAI can also provide learners with rich cultural background knowledge through multimodal content generation technology, thereby improving learners' intercultural literacy [5]. Through the multimodal cultural learning method, learners can not only improve their language ability but also enhance their cross-cultural understanding ability, which lays a solid foundation for future cross-cultural communication.

2.3.2. Values guidance and critical thinking

Integrating cultural critical elements into language teaching is an important application of GenAI in foreign language teaching. In English intercultural teaching, DeepSeek can generate supplementary materials from a multi-cultural perspective to guide learners to dialectically analyze the ideology behind the language in view of the possible Western centralism narrative in the teaching materials. Through the cultivation of critical thinking, learners can develop the ability to think independently and avoid blindly accepting any culture or value.

At the same time, GenAI can also help learners understand the differences in values under different

cultural backgrounds through scenario simulation and case analysis. For example, when learning Arabic, GenAI can provide cases on religious beliefs and social norms in Arabic culture to guide learners to discuss and analyze. Through this kind of critical thinking training, learners can not only improve their language skills but also enhance their intercultural understanding and develop a global perspective and multicultural awareness.

2.3.3. Global competence and digital skills literacy

It is important for foreign language learners to improve their global competence and digital skills. In the context of globalization, foreign language learners need to be able to understand diverse values in different cultural, social, and political contexts, have cross-cultural communication skills, an international perspective, and the ability to solve global problems. GenAI can help foreign language learners to broaden their international perspective, have the ability to think from a global perspective, and be able to use foreign language knowledge and subject knowledge to analyze global problems, such as climate change, poverty, public health, etc.

Digital skills literacy includes safe and effective use of digital technology, adoption of digital tools and platforms to enhance learning and work efficiency, compliance with digital ethics and legal norms, information literacy, and cybersecurity awareness. For foreign language learners, under the dual background of globalization and digitalization, they not only need to master foreign language knowledge, but also need to access global information and participate in cross-cultural communication through digital technology.

3. Application risks of GenAI in foreign language education

Although generative AI has opened up a new path for the precision of foreign language teaching and the improvement of talent training efficiency, its application in the field of foreign language education also faces many challenges.

3.1. Risk of language accuracy: Model bias and error reinforcement

Grammatical errors or non-standard expressions in the GenAI training set may be copied by learners, resulting in the solidification of incorrect knowledge. For example, if DeepSeek has insufficient knowledge of French gender articles, it may produce incorrect collocations such as "la garcon." Such errors not only impair learners' linguistic accuracy but may also be reinforced in the long term. Therefore, strict quality audits must be implemented on GenAI's training data to ensure the accuracy of its language output and prevent misleading learners.

3.2. Risk of cultural misreading: Stereotypes and contextual distortion

GenAI may exacerbate cultural biases and lead to misperceptions of culture. For example, when generating Arabic materials, if the corpus overemphasizes labels such as "religious" and "conservative," it may output one-sided cultural descriptions and prevent learners from forming comprehensive cognition. Such cultural misunderstanding not only affects learners' intercultural communication ability, but also encourages cultural misunderstanding and prejudice. In order to prevent such cases, it is necessary to balance the cultural description of GenAI from multiple dimensions to ensure that the cultural information output by GenAI is comprehensive and fair.

3.3. Risk of technology dependency: Reduced language creativity

Over-reliance on GenAI to complete writing or translation tasks may lead learners to neglect the self-cultivation

of language ability and weaken the ability of autonomous expression. Neuroscientific studies have shown that long-term dependence on AI assistance will reduce the activity of Broca's area (language production center), thereby affecting the development of language creativity. Therefore, educators need to guide learners to use GenAI properly and encourage them to strengthen the internalization and creative use of language while using AI assistance.

The excessive use of AI, in addition to causing learners to develop technology dependency, may also lead to learners lacking the ability to think and solve problems independently when faced with complex language tasks [6]. For example, in the process of writing, if learners rely too much on the content generated by GenAI, they may ignore the improvement of their own language expression and thinking ability. Therefore, it is necessary to focus on cultivating learners' autonomous learning ability and critical thinking in the teaching process, so that they can maintain the ability of independent thinking and creative expression while using GenAI.

3.4. Risk of data privacy: Sensitive information leakage

Foreign language learning involves a large amount of personal information, such as voice biometrics, cross-cultural communication records, etc. If the security protection of the GenAI system is insufficient, it may lead to the malicious use of this sensitive information. For example, learners' voice data may be used for technology development without consent; cultural exchange records may be used commercially and violate privacy rights. Therefore, it is necessary to strengthen the data security measures of the GenAI system to ensure that the personal information of learners is properly protected to prevent the risk of privacy disclosure.

On the other hand, data privacy issues may also affect learners' trust and acceptance of GenAI. If learners are worried about personal information leakage, they may have reservations about using GenAI, which may affect their use of AI tools. Therefore, in the development and application of GenAI, we should pay attention to privacy protection, establish a perfect data security management system, and ensure the information security of learners.

4. Risk response strategies for foreign language education

4.1. Building a dual-track training system of "AI-language literacy"

4.1.1. Teacher training

In order to improve the quality of foreign language education and meet the challenges brought by GenAI, it is crucial to carry out targeted teacher training programs. Specifically, special AI linguistics workshops should be set up to enhance teachers' ability to recognize and cope with model deviations. For example, by comparing manual review with AI-produced lesson plans, teachers can directly observe GenAI's potential shortcomings and thus cultivate GenAI's prudent cognition of technology. This kind of comparative analysis can not only help teachers grasp the strengths and limitations of GenAI but also provide guidance for them to rationally use GenAI in teaching practice.

In the training phase, teachers also need to learn how to effectively integrate GenAI into routine teaching activities, which includes familiarizing themselves with the basic operation of GenAI tools, mastering the application methods of GenAI tools in various teaching occasions, and flexibly adjusting GenAI use strategies according to teaching objectives and learners' needs. Through the training, teachers can turn AI into an effective tool to enhance teaching effectiveness, and then guide learners to properly use AI technology in the teaching process to prevent problems such as technology dependence and cultural misunderstanding.

4.1.2. Learner education

In the aspect of learner education, the teaching of "technology ethics" should be incorporated into the language curriculum. Foreign language majors can set up "technology ethics" courses, which aim to explore the moral issues, social responsibilities, and values involved in the development and application of technology. In such courses, teachers can introduce cultural distortion cases in artificial intelligence translation to guide learners to analyze and discuss. Through case analysis, learners can deeply understand the possible cultural deviations in the language generation process of GenAI, so as to improve their digital citizenship literacy. This not only helps learners to use GenAI more wisely but also cultivates learners' critical thinking and ethical awareness.

4.2. Building a "humanities-technology" collaborative education ecosystem
4.2.1. Integration of interdisciplinary resources

In order to ensure the efficient use of generative artificial intelligence in foreign language teaching, it is necessary to promote the integration of multidisciplinary resources. Specifically, linguistic researchers and technical talents should be combined to build a foreign language learning corpus. This corpus aims to ensure the diversity and accuracy of the output of artificial intelligence, so that it can not only meet the linguistic standards but also show the distinctive characteristics of different cultures in language generation. In the process of cooperation, the integration of multi-disciplinary resources is helpful to promote the academic exchange and integration of linguistics and technology. Through the regular organization of academic forums, seminars, and other activities, it enhances the thinking collision and experience exchange between linguistics researchers and technical talents, promotes the progress of academic fields and technical improvement, and provides solid support for foreign language teaching reform and innovation.

4.2.2. Optimized human-computer division of labor

In the intelligent assisted teaching system, it is particularly critical to reasonably divide man-machine responsibilities. Specifically, the learning of basic modules such as grammar and words can be handed over to the intelligent system, and the core teaching tasks such as cultural interpretation and values education can be handed over to teachers. This assignment of duties can not only give full play to the advantages of intelligent systems in language processing, but also ensure that teachers play their unique role in teaching activities.

Through scientific human-computer collaboration, teachers can devote more time to the core areas of teaching, such as the in-depth analysis of culture, the cultivation of values, and the shaping of critical thinking. This will help to improve the quality and effectiveness of teaching, so that learners can not only master language skills, but also deeply understand the cultural connotations and values carried by the language. In addition, human-computer collaboration can also improve teaching efficiency and make the teaching process more fluent and efficient. The intelligent system can quickly process a large amount of language data, provide rich teaching resources and auxiliary tools for teachers, reduce teachers' work pressure, and make them focus more on the key links of teaching.

4.3. Improving algorithm governance and data security framework
4.3.1. Implementing transparent regulation

To ensure the sound development of GenAI, it is necessary to build a regulatory system with high transparency. Specifically, GenAI service providers should disclose the data sources and annotation specifications of their language models and accept the review of independent third parties. Referring to the relevant regulations of the European Union's Artificial Intelligence Act and China's Interim Measures on the Management of Generative

Artificial Intelligence Services, it can be seen that transparent supervision of AI content providers will contribute to the healthy development of the industry, which will not only enhance public trust in AI, but also contribute to the normalization and standardization process of the AI industry.

4.3.2. Privacy-enhancing technologies

Protecting data privacy is critical in GenAI applications. In order to protect user information security, the use of privacy enhancement technology can improve data security and credibility, and protect user data. For example, the encryption and desensitization algorithms are used to process and desensitize language data locally to prevent the illegal use or disclosure of the original data, which helps to enhance users' trust in GenAI and promote the wide use of the technology. Privacy enhancement technology can also stimulate the innovation of GenAI technology. On the basis of protecting privacy and making full use of data resources, GenAI service providers can develop more accurate and efficient models to optimize application effects and user experience. This will help AI technology expand into more fields and create more value for society.

5. Conclusion and suggestions

Generative artificial intelligence has brought the possibility of paradigm change for foreign language education, reshaping teaching content through dynamic knowledge scheduling, innovating learning forms through immersive interaction, and iteratively upgrading educational objectives through teaching models. It reconstructs the educational paradigm from three dimensions of teaching, learning, and educating through the technical closed loop of "precise scheduling, reasoning enhancement, and cognitive expression." However, the risks associated with technology empowerment, such as knowledge distortion, value deviation, cognitive dependence, and data security, urgently need to be resolved through systematic strategies such as intelligent literacy cultivation, educational ecological reconstruction, and algorithm ethical governance. In the process of applying generative AI, attention should be paid to cultivating learners' deep understanding and perception of language and culture, and preventing excessive reliance on technology while ignoring its humanistic value.

From the perspective of practice, challenges and risks of GenAI in foreign language education are inevitable. Only through critical integration can the paradigm upgrade of foreign language education from "AI replacement" to "AI enhancement" be realized. In this process, maintaining humanistic care in education, ensuring learners' cognitive autonomy, and cultivating unique human traits are the core issues of foreign language teaching reform in the intelligent age. This requires educators, technology developers, and policy makers to form a community of values, seek a balance between technological progress and educational authenticity, and jointly create a new situation of human-computer collaboration in foreign language teaching.

Future research needs to further explore the deep integration of GenAI and language learning theory and transform classical language acquisition theory into quantifiable AI tutoring strategies. At the same time, strengthening interdisciplinary cooperation is also an important direction for the future development of foreign language education. The interdisciplinary integration of linguistics, education, computer science, psychology, and other disciplines will provide strong support for building a new prospect of foreign language education that takes into account both technological innovation and cultural sensitivity. Through interdisciplinary cooperation, we can give full play to the advantages of various disciplines, solve the technical, educational, and cultural problems faced by GenAI in foreign language education, promote the comprehensive development of foreign language education, and build a new prospect of foreign language education that takes into account both

technological innovation and cultural sensitivity, so as to cultivate foreign language talents with international vision, cross-cultural communication ability, and innovation spirit, to contribute to the cultural exchange and cooperation under the background of globalization.

Disclosure statement

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