DeepSeek in Foreign Language Education:Innovations, Technical Boundaries and Future Trajectories

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Abstract:The rapid advancement of AIGC has created transformative opportunities for foreign language education in higher education. DeepSeek, its innovative applications—such as AI-assisted instruction, learning, assessment, and research—demonstrate significant potential to enhance instructional efficiency, support individualized student learning, and reduce educators'workloads. However, integrating DeepSeek into language education also reveals technical limitations, including risks of over-reliance that may weaken students'critical thinking and challenges in defining academic integrity boundaries. Future research should prioritize human-AI collaborative teaching models, develop "guidance-oriented" (rather than answer-driven) AI tools,and Investigate into "AI-resistant assessment" frameworks.

Keywords: Generative Artificial Intelligence (AIGC); DeepSeek; Digital Transformation of Foreign Language Teaching

1. The Transformative Opportunity for Foreign Language Teaching in Higher Education under the Wave of Generative AI

The introduction of the open-source model DeepSeek-R1 by DeepSeek in January 2025 signified a notable shift in the AI landscape, as it swiftly surpassed ChatGPT to lead the free application download charts on Apple's App Store in both China and the United States. This development fundamentally challenged the long-held international perception that AI research and development necessitates prolonged timelines and massive capital investment . The ascent of DeepSeek denotes a critical juncture in the worldwide AI competition, potentially moderating the pace of monopolization by U.S. high-tech capital and illustrating China's capacity to reconfigure the global AI development paradigm.

According to the McKinsey Global Institute report titled "*The Economic Potential of Generative AI: The Next Productivity Frontier*," approximately half of all current work activities could be automated by AI around the year 2045. Conversely, individuals possessing higher-order intellectual capabilities such as creativity and profound critical thinking are positioned to harness AI. This impending shift will inevitably impose new demands on educational systems, specifically concerning curriculum design, program establishment, and the cultivation of future talent.[1]

Confronting the pervasive wave of AIGC, the multifaceted value of language becomes increasingly pronounced: its strategic role as a primary medium for communication, its functional importance as underlying data, and its humanistic significance as a cornerstone of cognitive literacy. The evolution of informatization in foreign language education has followed a logical progression from initial technological integration, to intelligent application, and toward the development of smart educational ecosystems (Table1[2]). DeepSeek acts as a crucial technological lever propelling foreign language education toward smarter practices. Its emergence intensifies human-AI interaction, and its rapid, accelerated evolution and broadening application within global education create an urgent imperative for comprehensive innovation across all dimensions of foreign language instruction.

Table1. The Evolutionary Logic of Digitalization in Foreign Language Education

Stage 1: Weak AI - Technologization in Foreign Language Education	
Focus:Advancing Display Capabilities	Hallmark: Augmented Reality (AR) Technology
⬇	
Stage 2: General AI - Intelligentization of Foreign Language Education	
Focus: Optimizing Algorithmic Efficiency	Hallmark: Affective Computing Systems
⬇	
Stage 3: Strong AI - Wisdomization in Foreign Language Education	
Focus: Achieving Deep Understanding	Hallmark: DeepSeek & AIGC Human-Computer Interaction

2. The "Aladdin's Lamp" of the Intelligent Era: Innovative Practices of DeepSeek in the

Intelligent Upgrade of Foreign Language Teaching

The advent of DeepSeek presents a significant opportunity alongside challenges for innovation in foreign language instruction.DeepSeek, as a leading-edge technology in the current generative AI era, functions more as an "Aladdin's Lamp" than a "Pandora's Box" in empowering foreign language teaching innovation. Its reasoned application demonstrates notable advantages across six dimensions: AI-facilitated teaching, learning, assessment, education, research, and management.

2.1 DeepSeek in Teaching Support: Unleashing Educator Creativity

The report *Shaping Future Learning: The Role of AI in Education 4.0 (2024)*highlights three critical challenges in global education: a worldwide teacher shortage, excessive administrative burdens on educators, and slow progress in bridging the digital skills gap within educational systems. To address these issues, the report emphasizes leveraging AI to streamline administrative tasks, thereby freeing teachers to focus more on meaningful teacher-student interactions .[3]

In January 2024, a British Council survey of 1,348 teachers across 118 countries and regions, published in the report of *AI and English Language Teaching: Preparing for the Future* , revealed that approximately 76% of educators integrate AI tools into English language instruction. Among these tools, AIGC ranked as the second most frequently utilized resource (Table 2).[4]

Table2. AI Tools for English Language Teaching: An Overview of Teacher Utilization

Most Frequently Used AI Tools by English Teachers	Adoption Rate	Specific Tasks for Which Teachers Use AI Tools	Adoption Rate
Language learning applications (apps)	48%	Preparing instructional materials	57%
Generative AI for language purposes (AIGC)	37%	Assisting students in practicing English	53%
Chatbots	31%	Preparing lesson plans and curriculum design	43%
Automated grading systems	22%	Correcting students' English errors	33%
Speech recognition software	21%	Assessing students' English proficiency levels	23%
Text-to-speech (TTS) tools	19%	Handling administrative tasks	19%
Not using any AI tools	24%	Have not used AI tools for the above tasks	18%

DeepSeek transforms foreign language education by enhancing lesson preparation, classroom management, and personalized instruction. It enables dynamic content creation, allowing educators to develop materials beyond standard resources through automated presentation outlines and video editing support.

The platform tracks student attendance and progress while providing teaching analytics and adaptive learning strategies. Its automated assignment handling streamlines grading and feedback processes.

By simplifying course development and instructional design, DeepSeek reduces preparation demands while maintaining educational quality, allowing teachers to focus on pedagogical innovation.

2.2 DeepSeek in Learning Support: Enabling Scalable Adaptive Learning

The integration of AI in education has evolved through three developmental phases: initial exploration, experimental implementation, and current industrial-scale application. Initially focused on fundamental classroom assistance, the field later embraced machine learning to develop intelligent tutoring and adaptive systems. Presently, with the advent of generative AI, the central focus has shifted toward achieving large-scale personalized adaptationin learning.[5]

DeepSeek facilitates learning by providing students with real-time, interactive support through language companions, programming assistants, and AI learning partners. It enhances "intelligent adaptation" in foreign language acquisition via learning diagnostics, error analysis, and personalized pathway planning. According to the British Council report, AI's primary contributions to English language teaching encompass speaking/writing/reading skill development, advancing pedagogical theory, and promoting adaptive learning.[6]

DeepSeek enables personalized tutoring through low-cost individual sessions, adapting curricula and resources to learner profiles. By analyzing student data, it delivers targeted content and guided support during tasks or after errors. Real-time intervention enhances comprehension with immediate feedback.

Studies confirm generative AI enhances personalized learning and automates assessment through adaptive testing. Users of AI vocabulary tools show increased self-directed learning and better performance.[7] In listening practice, chatbots reduce anxiety via neutral practice spaces, building confidence and skills.

Overall, DeepSeek addresses key gaps—including poor task planning, limited guidance, and delayed feedback—advancing personalized, digitally-informed language

education.

2.3 DeepSeek in Research Support: Enhancing Academic Efficiency through Disruptive AI

As a transformative technology, DeepSeek is emerging as a significant tool for empowering academic research in foreign language studies. China's inaugural Artificial Intelligence Application Guidelines in Education (2024)highlight the role of AIGC in innovating research paradigms—establishing intelligent experimental platforms, developing AI research assistants, and facilitating human–AI collaboration to generate novel data, hypotheses, and solutions[8].

A notable example of AI-driven scientific acceleration is AlphaFold, developed by Demis Hassabis and John Jumper, which predicted the structure of nearly 200 million proteins and earned the 2024 Nobel Prize in Chemistry.

For foreign language researchers, DeepSeek enables:Topic Identification: uncovering research gaps through semantic analysis, predicting high-growth areas, and suggesting interdisciplinary opportunities;Literature Review: synthesizing sources, constructing knowledge graphs, and generating preliminary drafts and logical mind maps via tools like X-Mind;Methodology Design: assisting in experimental planning, data processing, visualization, and analytical workflows;Manuscript Preparation: supporting structured writing through layered prompts, optimizing titles and abstracts, and drafting method or conclusion sections; Revision and Polishing: aiding in translation, proofreading, and content refinement;Peer Review: facilitating efficient and accurate manuscript evaluations;Journal Submission: matching suitable journals and generating submission letters.

From an application standpoint, DeepSeek alleviates repetitive research tasks, reduces academic workload, and enhances overall productivity in foreign language scholarship.

2.4 DeepSeek in Assessment: Constructing a Tri-Dimensional AI-Driven Evaluation Framework

Traditional foreign language assessment often faces challenges related to fragmentation, static methods, and subjectivity. The era of artificial general intelligence, characterized by AIGC, necessitates a paradigm shift in evaluation approaches. DeepSeek's core technical capabilities—including multimodal input processing, deep learning evaluation models, and real-time feedback generation—along with high-accuracy speech assessment and large pre-trained language models, enable a transformation from experience-driven to data-driven evaluation, from outcome-based to process-oriented tracking, and from teacher-centered to learner-centered assessment.

This facilitates a collaborative multi-agent evaluation mechanism involving teachers, students, and the system itself:For instructors, DeepSeek offers analytical support for teaching decisions;For students, it enables personalized learning path design and real-time progress visualization;At the system level, it integrates classroom, homework, and assessment data to dynamically monitor educational quality, automatically generate student learning portfolios, and identify areas needing improvement.

In summary, DeepSeek's application in language education highlights the transformative potential of advanced technology in building an intelligent digital ecosystem that interconnects teaching, learning, assessment, and research. It provides a theoretically grounded and practically viable solution for foreign language education reform in the AIGC era.

3. Technical Boundaries and Future Research Directions of DeepSeek in Foreign Language Education

While DeepSeek demonstrates China's innovative capacity in AI and influences global AI development patterns, its application in language education involves certain technical and ethical boundaries that require careful consideration:

Tool vs. Agency Boundary: DeepSeek should function as a "digital assistant" rather than a decision-maker in language learning. While it efficiently handles tasks like translation and pronunciation correction, it cannot replace students' deep engagement with cultural context and linguistic nuance. Current generative AI often struggles with accurately conveying metaphors and cultural imagery in literary translation, which may lead to emotional misinterpretation and student misinformation.

Skill Development vs. Replacement risk: Although DeepSeek's adaptive learning systems

offer personalized resources and instant feedback to enhance language practice, overreliance risks diminishing students' capacity for independent critical thinking in a foreign language—particularly if users uncritically adopt AI-generated translations or essays without verification.

Academic Integrity vs. Technical Aid: Universities are establishing ethical guidelines for AI use. For example, in June 2024, East China Normal University and Beijing Normal University jointly issued the Guidelines for Student Use of Generative AI, stipulating that AI-generated content should not exceed 20% of any submitted work.Similarly, Fudan University's policy prohibits AI involvement in key research processes such as experimental design, data collection, and thesis writing[9]—aiming to preserve transparency and academic integrity.

In the digital transformation of language education, DeepSeek serves as a scaffold to enhance—not replace—human intellect, and as a double-edged sword that boosts efficiency but demands cautious application. Educators should leverage DeepSeek to innovate teaching practices while critically evaluating its long-term impacts, ethical limits, and systemic implications.

Future research should extend beyond higher education to include K-12 and adult learning contexts, and focus on DeepSeek-informed pedagogy, human-AI collaborative teaching models, AI-resistant assessment design, and the creation of guidance-oriented—rather than answer-driven—AI assistants. Critical attention must also be given to teacher AI literacy training, as well as the boundaries, long-term efficacy, and sustainability of DeepSeek in language education.

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