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Application and Reflection of AI Technology in College English Teaching

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Abstract: This paper discusses the application and reflection of AI technology in college English teaching. Confronted with challenges like unmet personalized learning needs, unequal resource distribution, and teachers' heavy workload in traditional classes, the author integrates AI tools and innovative scenarios based on teaching practice. Direct applications include Doubao AI's hierarchical oral training, automated grading with error profiling, and Liulishuo's phonetic correction. Gamified designs using large models (e.g., DeepSeek V3) enhance vocabulary and grammar learning. A "knowledge base-agent-workflow" framework is developed for complex tasks, combining knowledge construction, customized agents (e.g., Grammar Coach), and automated workflows. The study emphasizes AI's role in transforming teaching to human-AI collaboration while stressing technology as a complement to educators for holistic student development.

Keywords: Artificial intelligence; College english Teaching; Oral training; Automated grading; Gamified learning

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1. Introduction

Artificial intelligence (AI) technology is permeating educational domains at an unprecedented rate, reshaping traditional pedagogical paradigms [1]. For college English instruction, conventional classrooms confront persistent challenges: personalized learning demands remain unmet due to large class sizes and diverse student proficiency; teaching resources—such as high-quality audio-visual materials or interactive platforms—are unevenly distributed across institutions; and teachers are overburdened by repetitive tasks like manual assignment grading and individualized feedback provision. To address these issues, the author, drawing on front-line teaching experiences, has explored the integration of AI tools, innovative learning scenarios, and systemic technology frameworks in English classrooms. This paper presents practical applications, challenges encountered, and reflective insights from these explorations.

2. Theoretical framework

This section contains an overview of the core of Human-Computer Interaction (HCI) theory. It covers the main elements and shows its significance in promoting college English teaching quality, facilitating teacher-student cooperation, enabling human-machine interaction, and driving the role transformation of both.

2.1. Core framework of the theory of human-computer interaction (HCI)

HCI was pioneered by Douglas Engelbart. Its core concept focuses on constructing a collaborative ecosystem of "human-machine-environment" [2]. It emphasizes that technology should design interaction logic following human cognitive laws instead of requiring users to adapt to machine rules. This theory has three main pillars: two-way interactivity, where humans and machines form a dynamic cycle through "input-processing-feedback"; user-centered design, which optimizes interfaces and processes based on user needs; and ability complementarity, where machines undertake structured tasks (such as automatic scoring and speech recognition) while humans dominate creative decision-making (such as teaching strategies and emotional feedback), forming a collaborative division of labor. **Figure 1** shows the relationship and interactive process between humans and AI.

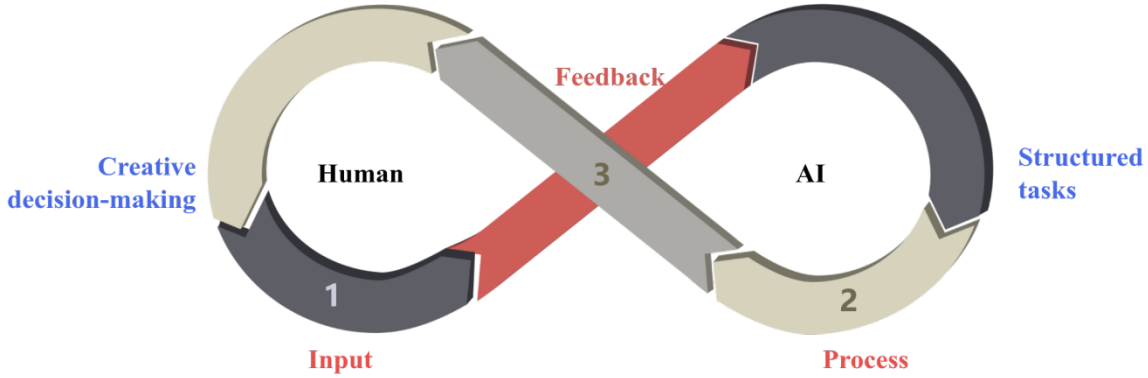

Figure 1. Relationship and interactive process between humans and AI

2.2. Practical mapping of HCI in the thesis

This discussion revolves around the application of HCI in the teaching-related content of the thesis. Specifically, there are three points:

Firstly, the hierarchical oral practice system of Doubao AI verifies the dynamic adaptation of two-way interaction. Also, the process of Liulishuo, a pronunciation correction tool, conforms to the principle in HCI that the timeliness of feedback can improve learning efficiency. As highlighted in the study, the dynamic adjustment of AI tools like Doubao AI—responding to learners' emotional cues and proficiency levels through real-time feedback—exemplifies how HCI principles bridge human needs and technological functionality in language education [3].

Secondly, the gamified learning modules and the digital vocabulary card workflow verify the user-centered scenario-based design. The gamified modules fit the HCI concept that visualizing the interface can promote understanding, and the digital vocabulary card workflow reflects the pursuit of task-process simplification in HCI.

Thirdly, the "Knowledge Base—Agent —Workflow" framework and the "Dual-Track" composition

scoring method verify the complementary abilities of human-machine collaboration. They also reflect the positioning of technology as an auxiliary tool in HCI.

In conclusion, these applications in the thesis always adhere to the HCI logic of "letting machines adapt to humans." They aim to enhance the naturalness and efficiency of human-machine interaction, and meanwhile, they stick to the principle that technology serves the essence of education, providing a practical example for human-machine collaborative teaching.

3. Direct applications of AI tools in English learning and training

3.1. Oral communication and dialogue training

Oral proficiency is a cornerstone of English language competence, yet traditional classroom settings—constrained by time limits and teacher-student ratios—often fail to provide sufficient individualized dialogue practice. To bridge this gap, the author adopted Doubao AI's conversational module to establish a "hierarchical-customized-feedback" oral training system. In this model, teachers define parameters such as language complexity (e.g., restricting dialogues to college curriculum vocabulary), topic scope (e.g., "campus life" or "sustainable development"), and interaction rules (e.g., allowing Chinese explanations for unfamiliar terms). These settings ensure that dialogues align with students' proficiency levels, from beginner to advanced.

HCI-driven systems, integrating real-time speech recognition and adaptive feedback, create personalized oral English learning paths tailored to learners' performance, as emphasized in Tang [4]. A notable feature of Doubao is its "humanistic perception" function, which analyzes students' emotional cues—such as frustration from repeated errors or excitement from successful expression—through linguistic and paralinguistic signals (e.g., response speed, word choice). For instance, if a student exhibits anxiety due to frequent grammatical mistakes, the system automatically softens its tone, reduces task difficulty, and provides encouraging feedback like, "Great effort! Let's try a simpler sentence together." Conversely, when a student demonstrates confidence, the AI introduces more complex topics (e.g., cultural debates) and challenges them to use advanced grammatical structures, fostering continuous improvement.

3.2. Automated assignment and test grading

As practical assignments evolve with technological advancements to better support student learning (as noted in the emphasis on their adaptive role in consolidating lecture concepts), Doubao's "multi-question recognition" capability streamlines test evaluation by automatically identifying question types (e.g., multiple-choice, essay) and cross-referencing answers with a pre-built database [5]. Beyond basic grading, the tool tracks each student's error patterns—such as subject-verb agreement mistakes or tense confusion—via account binding, generating a "personal error profile." This profile enables targeted remediation: teachers can request Doubao to generate customized exercises (e.g., "Create 8 subject-verb agreement questions focusing on third-person singular errors"), creating a closed loop of "error diagnosis-practice-consolidation."

In essay grading, Doubao employs a "dual-track scoring" system: one track uses general AI rubrics (assessing content, language accuracy, and structure), while the other allows teachers to customize criteria (e.g., allocating 20% of the score to cultural awareness, as defined by course objectives). However, limitations persist: AI struggles with nuanced judgments of semantic coherence or cultural connotations (e.g., distinguishing between appropriate and overly literal translations of idioms). Thus, manual review remains critical to ensure

holistic evaluation.

3.3. Phonetic correction and pronunciation training

Tools like Liulishuo, specialized in speech recognition, offer real-time phonetic analysis to pinpoint pronunciation errors (e.g., mispronouncing /æ/ as /e/ in "cat"). As highlighted in Cano, integrating information visualization (InfoVis) and human-computer interaction (HCI) can enhance pronunciation learning by enabling visual capture of diverse voice characteristics, a principle aligning with tools like Liulishuo's structured training framework [6]. The training process follows a "listen-identify-correct" framework: first, students compare their pronunciation with standard audio recordings; second, they engage in "sound-discrimination games" (e.g., distinguishing between /i:/ and /ɪ/ in minimal pairs like "sheep" vs. "ship"); finally, they practice through "shadowing" (repeating after the model), recording their attempts, and comparing them to the standard using visual wave-form overlays. This structured approach has shown significant improvement in students' phonetic accuracy, as evidenced by post-training assessments.

4. Gamified English learning design leveraging large models

Gamification—characterized by immediate feedback, sustained motivation, and skill reinforcement—has proven effective in engaging students. Traditionally, game development required programming expertise, but large language models (LLMs) like DeepSeek V3 and Alibaba Qianwen now enable teachers to design customized educational games with minimal technical background.

Rodrigues et al. indicated in their research that personalization can enhance the effect of gamification [7]. In the design of gamified English learning leveraging models here, it means educators can customize game tasks according to students' English proficiency levels. For vocabulary memorization, the "Word Match" game was created: a grid of 16 words (8 synonym/antonym pairs) where students match correct pairs within a time limit. Successful matches trigger audio pronunciation and contextual examples (e.g., "sustainable: The city aims for sustainable development"). To enhance educational value, the game's difficulty adapts dynamically: initial levels display base forms (e.g., "happy"), while advanced levels use derivatives (e.g., "happiness") or collocations (e.g., "happy-go-lucky"). Incorrect matches provide error explanations (e.g., "These are synonyms, not antonyms") and etymological insights (e.g., "Antonym derives from Greek anti- meaning 'against'").

Grammar practice games, such as "Sentence Builder", focus on fundamental structures (e.g., S+V+O). Students drag word blocks (e.g., "Tom", "bought", "a book") into correct sequences, receiving real-time feedback on issues like missing subjects or incorrect word order. Additionally, the "English Roulette" tool—powered by class rosters and knowledge checklists—randomly selects students and questions (e.g., "Lily, use the past perfect tense to describe your weekend"), promoting equal participation and reducing teacher bias.

5. Integrated multi-technology solutions for complex learning tasks

For complex tasks like project-based learning or cross-unit thematic research, single AI tools often fall short. To address this, the author developed a "knowledge-agent-workflow" integration framework [8]. The operational visualization process is as follows (**Figure 2**).

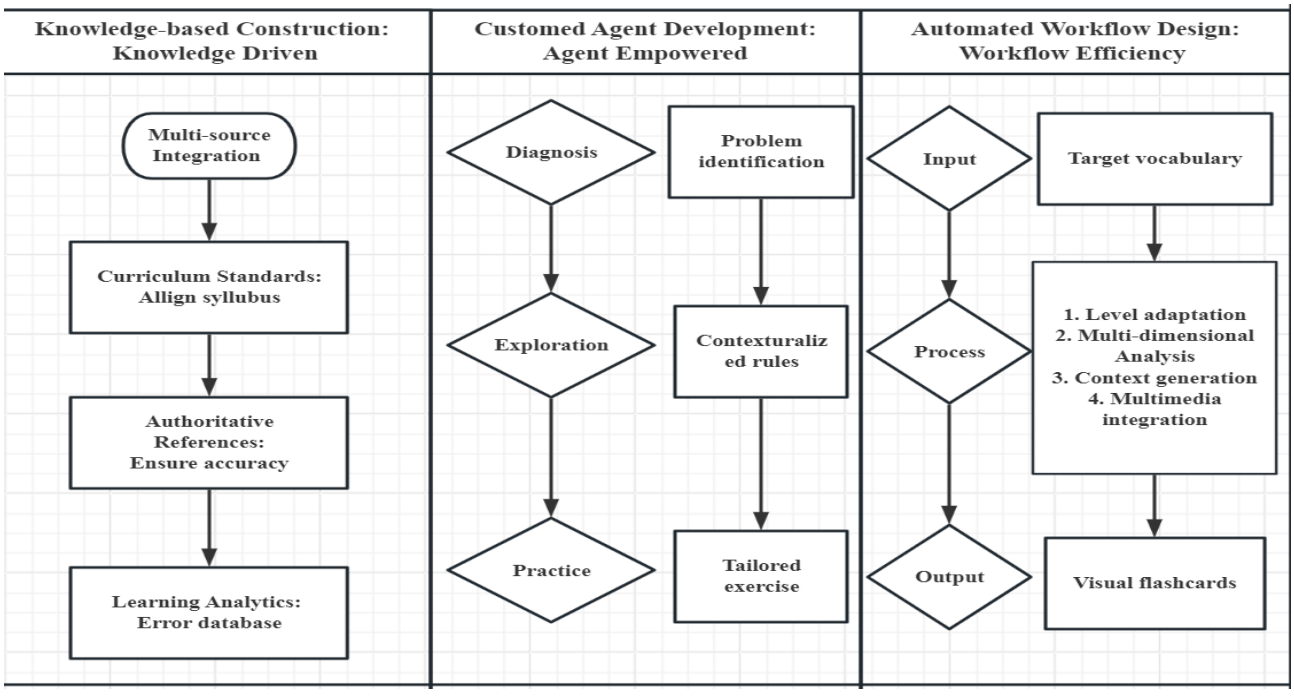

Figure 2. Integration framework of "knowledge-agent-workflow" based on multi-technology solutions

5.1. Knowledge base construction

High-quality knowledge bases are vital for key applications [9]. Manual construction is time-consuming. A robust knowledge base is critical for reliable AI outputs. For grammar instruction, the author compiled resources including: (1) grammar requirements from the College English Curriculum Standard (e.g., verb tenses, non-finite verbs); (2) textbook examples and explanations from authoritative references (e.g., Oxford English Grammar); and (3) a repository of student errors (e.g., "I have went" instead of "I have gone"). This database ensures that AI responses are grounded in accurate, curriculum-aligned content, minimizing "hallucinations" (AI-generated misinformation).

5.2. Customized agent development

Studies show that most chatbot research in education is in its early stages and uses quantitative methods. General chatbots thus lack the specificity for targeted teaching. Customized agents like the "Grammar Coach" integrated with a knowledge base are necessary to provide functions such as diagnosis, explanation, and practice generation for better teaching results [10]. By integrating a "Grammar Coach" agent with the custom knowledge base, the author created a tool that supports three key functions: (1) Diagnosis: Identifying the root cause of a student's question (e.g., "Why is 'I have finished yesterday' incorrect?"); (2) Explanation: Drawing on the knowledge base to provide contextualized rules (e.g., contrasting present perfect and simple past tense usage); (3) Practice Generation: Creating tailored exercises (e.g., "Fill in the blanks: She _____ (read) the book twice last month").

5.3. Automated workflow design

To streamline repetitive tasks, a workflow for "digital vocabulary flashcards" was designed [11]:

Input: Teachers or students enter a target word (e.g., "sustainable").

Processing: The system sequentially applies modules for grade-level adaptation (matching to curriculum requirements), multi-dimensional analysis (extracting part of speech, etymology, synonyms), context generation (drawing from the COCA corpus for authentic examples), and multimedia integration (generating audio pronunciations and QR codes linking to extended resources).

Output: Visual cards are created using design tools like Canva, combining text, audio, and interactive elements, and shared via learning platforms for easy access.

6. Conclusion

The integration of AI, driven by the theory of HCI, is redefining college English teaching by shifting from teacher-centered knowledge transmission (where educators primarily "teach" and "instruct") to a human-AI collaborative model that prioritizes competence development. This transformation also evolves from standardized instruction to personalized learning, with teachers transitioning from traditional roles of "teaching" and "instructing" to becoming "collaborators" alongside machines. Concurrently, students have shifted from being passive recipients of information to actively involving themselves in classroom activities and practical applications, thereby evolving into proactive "learners" who drive their own educational processes. Crucially, the collaborative dynamic between teachers and students, augmented by AI, has significantly promoted the enhancement of college English classroom quality and efficiency, enabling a more interactive, adaptive, and effective learning ecosystem.

Yet, technology remains a tool for human educators. True educational growth occurs when AI operates invisibly, supporting students as inconspicuous learning partners, and empowering teachers to transition from "content deliverers" to "learning designers" who curate, guide, and inspire. As people navigate this transformative era, the focus must remain on nurturing students' holistic development, ensuring that technology serves, rather than overshadows, the human heart of education.

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Disclosure statement

The author declares no conflict of interest.

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