"AI as Colleague": A Study on the Restructuring of Vocational Undergraduate English Teaching Models Driven by Agent AI

Chunlan Xu*

Foreign Language Teaching Department ,Hainan Vocational University of Science and Technology, Haikou, 571126, China
**Corresponding author: xuchunlan7799@163.com*

Abstract: *The rise of intelligent agent (Agent AI) technology, which possesses autonomous task planning and cognitive collaboration capabilities, has made the metaphor of "AI as colleague" a novel theoretical perspective and practical pathway for reforming vocational undergraduate English teaching. This study aims to explore the restructuring logic of vocational undergraduate English teaching models driven by Agent AI. It first clarifies the theoretical connotation of Agent AI as a "collaborative subject" and its alignment with the essential demands of vocational English teaching. Subsequently, the paper systematically elaborates on the directions for restructuring from three core dimensions: teaching objectives, content, and process. Teaching objectives should shift from cultivating singular language proficiency to incorporating human-machine collaboration literacy; teaching content should establish a real-time evolution mechanism based on dynamic corpora and agent feedback; and the teaching process should rely on a multi-agent architecture to achieve layered interaction and adaptive learning path design. Finally, the study proposes an evolutionary direction toward the normalization of "AI colleagues," which includes the transformation of the teacher's role into that of a learning ecosystem architect and coordinator, the construction of a blended learning space integrating embodied and distributed cognition, and the establishment of an iterative optimization cycle based on data intelligence and pedagogical reflection. This study provides a systematic theoretical framework and analytical perspective for understanding the transformation of vocational language education paradigms in the intelligent era.*

Keywords: *Agent AI; vocational undergraduate English teaching; teaching model restructuring; human-machine collaboration literacy; cognitive collaboration; blended learning space*

Introduction

Vocational undergraduate English teaching currently faces the fundamental challenge of effectively aligning with rapidly evolving professional landscapes and the increasingly prevalent human-machine collaboration work models. Traditional teaching models exhibit limitations in addressing the complexity, dynamism, and demand for composite competencies within vocational contexts. Meanwhile, the current application of educational technology often remains at the level of instrumental assistance, failing to deeply engage with the structural transformation of teaching relationships. Therefore, investigating the integration of Agent AI-possessing autonomy and potential for social interaction-as a "collaborative subject" into teaching, and using it to drive the systematic restructuring of teaching models, holds significant theoretical necessity and practical urgency. The significance of this study lies in its theoretical explication of the pedagogical implications of the new metaphor "AI as colleague" and its systematic construction of a three-dimensional restructuring framework for teaching objectives, content, and processes driven by Agent AI. This aims to transcend a purely instrumental view of technology, providing a coherent, in-depth, and actionable theoretical blueprint and developmental pathway for vocational undergraduate English education to achieve a paradigm shift in the intelligent era.

1. Theoretical Clarification of Agent AI and the "Colleague" Metaphor and Its Pedagogical Implications

1.1 The Autonomy Architecture and Cognitive Collaboration Features of Agent AI

The core architecture of Agent AI differs from traditional responsive systems. Its autonomy is manifested in a goal-oriented cycle of task decomposition, environmental perception, and dynamic decision-making. Such agents, through built-in planning and reasoning modules, can independently generate and execute sequences of subtasks within a preset objective framework, while also adjusting their strategies based on real-time feedback during interaction. This architecture endows them with a proactiveness analogous to human workflows, moving beyond mere reliance on pre-programmed fixed instructions or pattern matching. At the cognitive level, the collaborative feature of Agent AI is demonstrated by its ability to process, interpret, and generate complex symbolic information and contextualized content, thereby complementing human cognitive processes. Through semantic understanding and generation, context maintenance, and multi-turn dialogue management, it simulates the role of a participatory cognitive partner, laying the foundation for deep interaction.

The combination of an autonomous architecture and cognitive collaboration features provides the technological premise for constructing new types of pedagogical relationships. Agent AI is no longer merely a tool for information presentation or simple feedback, but rather an actor capable of understanding teaching intentions, intervening in cognitive processes, and contributing strategic insights. Its cognitive collaboration is manifested in the analysis of learners' language output, the diagnosis of learning obstacles, and the provision of immediate suggestions for personalized learning pathways. This enables it to transcend the scope of a static knowledge base, evolving into an intelligent entity with a certain degree of pedagogical agency. These characteristics suggest its potential for a role shift within educational scenarios-from an assistive tool to a collaborative subject[1].

1.2 Role Positioning and Interaction Logic of "AI as Colleague" in Teaching Relationships

The metaphor of "AI as colleague" aims to redefine the position of intelligent systems within the dynamic structure of teaching. The colleague relationship implies a relatively equal collaborative status, shared task objectives, and ongoing exchange of skills and knowledge. Under this metaphor, the role positioning of Agent AI shifts from that of an instrumental "service provider" to a "collaborator" and "co-constructor" within the teaching process. It assumes some of the responsibilities traditionally borne by teachers or learning peers, such as providing immediate scaffolding, collaborating on language projects, conducting simulated dialogue drills, and demonstrating a degree of autonomous initiative in the process. The key to this positioning lies in its participation being interactive and generative, rather than merely passively responsive.

The interaction logic underpinning this role positioning is a dynamic dialogic process based on shared task burden and cognitive alignment. Interaction is no longer confined to a simple "question-answer" pattern but evolves into continuous and constructive negotiation and co-construction centered around shared teaching objectives. By analyzing the learner's cognitive state, emotional signals, and behavioral data, Agent AI adjusts its interaction strategies and content difficulty to maintain the fluency and effectiveness of the collaboration. This interaction logic simulates the collaborative model between human colleagues, emphasizing bidirectional adaptation and jointly advancing problem-solving, thereby creating a sustained and productive collaborative cognitive space within the teaching environment.

1.3 Analysis of the Essential Demands of Vocational Undergraduate English Teaching and the Compatibility of Agent AI

The essential demand of vocational undergraduate English teaching focuses on cultivating composite abilities for effective cross-linguistic communication and professional information processing within specific vocational contexts. This demand transcends the teaching of general language skills, emphasizing the instrumental, situational, task-based, and immediately applicable nature of language. Teaching must simulate authentic workplace language use, focusing on developing students' strategic language application skills, comprehension and construction of professional discourse, and intercultural professional coordination abilities within complex, dynamic, and often unpredictable vocational tasks. Its core lies in achieving a seamless connection between language learning and professional practice.

The technical features of Agent AI demonstrate a high degree of structural compatibility with the aforementioned demands. Its autonomy and situational awareness enable it to construct and manage highly simulated vocational task environments, such as simulating business negotiations, collaborative technical document writing, or customer service dialogues. During task execution, Agent AI can provide real-time language feedback, strategic suggestions, and cognitive scaffolding that align with industry standards. Its capacity to handle dynamic, multimodal professional information precisely meets the demands for informational complexity within vocational contexts. Furthermore, as a sustainable "colleague" for interaction, Agent AI can provide frequent and personalized opportunities for language practice in vocational scenarios, which are difficult to achieve in traditional classrooms. The process of long-term collaboration between Agent AI and learners itself serves as a rehearsal for and adaptation to the sustained human-machine collaboration models prevalent in the professional world.

2. Restructuring Dimensions of Vocational Undergraduate English Teaching Models Driven by Agent AI

2.1 Restructuring Teaching Objectives: From Language Competency Development to the Cultivation of Human-Machine Collaboration Literacy

Traditional vocational undergraduate English teaching objectives primarily focus on developing language knowledge and communicative competence within specific industry domains. Their design paradigm usually centers on the standardized achievement of discrete skills such as listening, speaking, reading, writing, and translation. With the introduction of Agent AI as a collaborative subject into the teaching environment, the scope of teaching objectives necessarily undergoes structural expansion. The singular mastery of "language" by the "human" evolves into the efficient completion of "professional communication tasks" by the "human-AI" collaborative system. Consequently, the core of teaching objectives must incorporate the new dimension of "human-machine collaboration literacy." Its connotations encompass advanced cognitive and social skills such as aligning intentions with intelligent agents, coordinating tasks, sharing responsibilities, and utilizing complementary human-machine strategies[2].

The cultivation of human-machine collaboration literacy does not replace language competency but rather repositions and empowers it within a more complex, dynamic, and authentic interactive system. Teaching objectives must emphasize learners' metacognitive abilities in intelligent environments. These include how to clearly articulate task requirements to an AI "colleague," effectively decompose and delegate subtasks, critically evaluate language content or strategic suggestions generated by AI, and perform debugging and remediation when collaboration fails. This shift in objectives signifies that the quality of vocational English competency will partly depend on the learner's ability to form an efficient and fluent collaborative workflow with Agent AI, thereby preparing for the increasingly prevalent human-machine collaboration models in future professional scenarios.

2.2 Restructuring Teaching Content: An Evolutionary Mechanism for Curriculum Content Based on Dynamic Corpora and Agent Feedback

A static, textbook-centric content system struggles to adapt to the dynamic interactive learning environment fostered by Agent AI and the rapid evolution of knowledge in professional fields. The direction for restructuring teaching content lies in establishing a mechanism capable of real-time evolution and personalized adjustment. One core data source for this mechanism is the linguistic output, question sequences, and behavioral data generated by learners during their interactions with Agent AI across various simulated professional tasks. This data constitutes a personalized dynamic corpus that reflects the learners' current proficiency levels and cognitive characteristics. Another crucial source is the latest industry-specific corpora, case studies, and communication paradigms acquired by Agent AI based on pre-set professional scenario models and real-time information interfaces.

Leveraging these diverse and dynamic data sources, teaching content can transition from being fixed and pre-determined to being continuously generated. Agent AI can perform immediate analysis on the learner corpus, identifying group-wide and individual knowledge gaps, skill deviations, or pragmatic inappropriateness. It can then automatically generate or recommend targeted remedial learning materials, micro-courses, or training tasks. Simultaneously, the system can continuously update the situational parameters and evaluation criteria of simulated tasks based on the latest industry

corpora, ensuring that the teaching content remains synchronized with professional frontiers. This evolutionary mechanism, driven by agent feedback, transforms teaching content into a living, organic entity that co-evolves with both the learners and the professional ecosystem.

2.3 Restructuring the Teaching Process: Layered Interaction and Adaptive Learning Path Design through Multi-Agent Intervention

The introduction of Agent AI deconstructs the teaching process from a linear "teacher-student" binary structure into a networked interactive structure involving multiple agents with specific functions and roles. The teaching process can be designed as a series of nested vocational task scenarios, where different Agent AIs assume differentiated roles such as project coordinator, domain expert, client, partner, or language coach. Learners gradually complete comprehensive language tasks ranging from simple to complex through layered, multi-round interactions with these agents. This multi-agent architecture simulates the communication scenarios involving diverse actors within authentic professional networks, making the learning process itself an immersive experience of complex professional communication systems[3].

Within this interactive network, the teaching process can achieve a high degree of adaptiveness. By continuously tracking performance data from learners' interactions with different agents, the system constructs a multidimensional profile of their capabilities. Based on this profile, the coordinating Agent AI can dynamically adjust the difficulty of task sequences, the interaction strategies of the agents, the level of support provided, and even reconfigure the combination of agent roles involved in the collaboration. This generates a unique, optimized learning path for each learner. This path is not pre-determined but continuously emerges and adjusts through interaction, ensuring the teaching process consistently aligns with the learner's "zone of proximal development," thereby achieving deep personalization within the context of large-scale instruction.

3. The Evolutionary Direction of Vocational Undergraduate English Teaching Toward Normalizing "AI Colleagues"

3.1 Teacher Role Transformation: Redefining Pedagogical Leadership in Intelligent Collaborative Environments

Under the normalization of Agent AI as a stable collaborative subject embedded within the teaching process, the traditional role of the teacher faces a fundamental transformation. The connotation and pathways for realizing pedagogical leadership must be restructured. This leadership no longer manifests as singular control over knowledge transmission but elevates to the systematic design, dynamic adjustment, and value-oriented guidance of a complex human-machine collaborative learning ecosystem. The core function of the teacher shifts to becoming the macro-architect of learning contexts, responsible for designing task-based scenarios that incorporate clear vocational objectives, integrate multiple agent roles, and preset interaction rules. Concurrently, the teacher acts as an in-depth mediator of cognitive processes, requiring the acute identification of cognitive friction or collaboration bottlenecks within the human-machine network and the implementation of precise intervention strategies to optimize collaborative efficacy. This transformation demands that teachers evolve from direct content lecturers into pedagogical engineers possessing foresight and systems thinking.

The core of this redefinition process lies in the teacher's need to accurately anchor their own irreplaceability within the intelligent network. The teacher becomes the critical nexus connecting learner cognition, multi-agent algorithms, and the complexities of the professional world. Their leadership is concretely reflected in the high-level setting of learning objectives and evaluation criteria, the supervision and calibration of Agent AI behavioral logic and feedback mechanisms, and the strategic cultivation of learners' development in "meta-competencies for human-machine collaboration." Particularly in areas involving cross-cultural pragmatic judgment, professional ethical dilemmas, creative problem-solving, and the stimulation of deep learning motivation, the teacher's professional wisdom and humanistic insight constitute crucial support that transcends the current boundaries of machine intelligence. Therefore, the teacher's authority will be increasingly founded upon their capacity for designing complexity, the artistry of coordination, and critical reflective ability.

3.2 Learning Ecosystem Construction: A Blended Learning Space Integrating Embodied and Distributed Cognition

The normalization of "AI colleagues" necessitates the construction of a novel learning ecosystem that transcends the boundaries of the traditional classroom. The essential characteristic of this ecosystem lies in the deep integration of physical experience, digital interaction, and social collaboration. Examined from a theoretical perspective, its design must synergistically integrate the principles of embodied cognition and distributed cognition. The principle of embodied cognition emphasizes that cognition is rooted in the interaction between the body and the environment. This requires that ecosystem design includes highly-simulated vocational task scenarios or augmented reality interfaces, enabling learners to deepen their understanding of the meaning and contextualized application of vocational English through embodied participation while performing specific operations, engaging in role-play, or processing multimodal information.

The principle of distributed cognition, meanwhile, views this ecosystem as a socio-technical system where cognition is distributed across humans, intelligent agents, tools, and the environment. From this perspective, language competence and vocational knowledge are not statically contained within individual minds but are continuously generated, circulated, and evolve within the interactive processes of human-machine collaboration. Therefore, the focus of building the learning ecosystem lies in creating the technical and social conditions that facilitate the smooth occurrence of distributed cognition. This includes developing digital tools that support real-time collaborative editing, dialogue analysis, and knowledge co-construction among multiple agents and learners, as well as designing learning dashboards capable of visually representing the dynamics of the collaborative network, the flow of cognitive contributions, and the trajectory of problem-solving. The ultimate outcome is a blended learning space that seamlessly integrates physical spaces, digital platforms, agent communities, and vocational contexts. Its core function is to foster an embodied, distributed, and highly contextualized socio-cognitive process[4].

3.3 Continuous Evolution Mechanism: An Iterative Optimization Loop Based on Data Intelligence and Pedagogical Reflection

To ensure that the teaching model can dynamically adapt to the rapid evolution of technology and vocational demands, it is essential to construct a structured, self-improving continuous evolution mechanism. The effectiveness of this mechanism relies on a dual-engine drive formed by the automated insights of data intelligence and the professional judgment of systematic pedagogical reflection. At the level of data intelligence, the teaching system needs to possess comprehensive, multimodal learning analytics capabilities. It should continuously collect behavioral sequences, dialogue texts, collaboration patterns, affective computing indicators, and task outcome data generated during human-machine interaction. By employing machine learning models for deep mining and correlation analysis, the system can automatically diagnose the efficacy levels of various elements within the teaching model and generate data-driven optimization recommendation reports[5].

At the level of pedagogical reflection, there is a need to establish an institutionalized, collaborative, evidence-based deliberation and design cycle. The teaching team must regularly conduct structured critical discussions, based on the analytical insights provided by data intelligence and combined with their pedagogical theories and domain knowledge. These discussions should focus on the appropriateness of teaching objectives, the challenge level of task scenarios, the pedagogical effectiveness of agent behaviors, and the scientific rigor of the evaluation system. This reflection aims to integrate implicit pedagogical wisdom with explicit data evidence, translating it into precise adjustment instructions for system design parameters, agent algorithm strategies, or curriculum content structure. Thus, a closed-loop optimization cycle of "data collection-intelligent analysis-professional reflection-design iteration" is formed. This renders the entire teaching model an adaptive complex system capable of sensing, analyzing, decision-making, and evolving, thereby achieving sustained spiral progression.

Conclusion

This study, through a theoretical clarification of the metaphor of Agent AI as a "colleague," systematically argues for the internal logic and specific dimensions of its potential to structurally restructure vocational undergraduate English teaching models. The research indicates that the core of

this restructuring lies in shifting the pedagogical focus from cultivating isolated individual language competence to fostering a "human-AI" collaborative system capable of efficiently completing complex vocational tasks in tandem with intelligent agents. This is concretely manifested in the objective restructuring oriented towards generating human-machine collaboration literacy, the content restructuring characterized by dynamic, real-time evolution, and the process restructuring based on multi-agent layered interaction. To achieve the sustainable development of this restructured model, the teacher's role must transform into that of a designer and mediator of the learning ecosystem. The teaching environment must evolve into a blended space integrating embodied and distributed cognition, and an iterative optimization mechanism driven by both data intelligence and professional reflection needs to be established. Future research and practice can build upon this foundation to further explore specific discourse patterns of human-machine collaboration in different vocational fields, develop more sophisticated agent roles and interaction models, and conduct in-depth evaluations of the development of learners' cross-domain competencies and long-term professional adaptability under this model. Concurrently, attention must be paid to potential accompanying deep-seated issues such as technological dependency and ethical boundaries.

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