Exploring the "Learner Autonomy" Teaching Model in College English under the Integration of AI and Disciplines

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Abstract: In the higher education system, college English teaching, as a core module for cultivating international talents, plays an irreplaceable role in enhancing students' career competitiveness and comprehensive quality. With the deepening development of the "learner autonomy" theory, universities are leveraging the technological dividends of the integration of artificial intelligence (AI) and interdisciplinary approaches to build a new teaching paradigm centered on students. This paper systematically analyzes the core characteristics of learner autonomy, explores the innovative applications of AI technology and interdisciplinary integration in teaching practice, and proposes specific strategies such as blended online and offline teaching and intelligent interdisciplinary integration. The aim is to provide theoretical references and practical pathways for cultivating talents with autonomous learning abilities, interdisciplinary thinking, and lifelong learning literacy in the new era.

Keywords: College English; Learner Autonomy; Artificial Intelligence; Interdisciplinary Integration

1. Introduction

In the era of deep integration of globalization and informatization, English, as the core medium for cross-cultural communication, has shifted its teaching objectives from the sole transmission of language skills to the cultivation of "holistic development" capabilities. The rise of the "Learner Autonomy" theory marks a paradigm shift in college English teaching from teacher-dominated to student-centered. By empowering students with the decision-making power over the content, methods, and pace of learning, their intrinsic motivation is activated, ultimately leading to the development of independent inquiry and lifelong learning abilities.

In recent years, the breakthrough progress of AI technology and its deep integration into the field of education have provided revolutionary tools for the cultivation of learner autonomy. Meanwhile, the trend of interdisciplinary integration has prompted college English teaching to break through the boundaries of a single language discipline. It has formed collaborative innovation with fields such as computer science, cultural studies, and educational psychology, creating a multidimensional teaching ecosystem of "technology empowerment + interdisciplinary integration". Against this backdrop, how to use AI technology to reconstruct teaching scenarios and optimize learning paths through interdisciplinary integration has become a key issue in enhancing learner autonomy.

2. Core Characteristics of Learner Autonomy in College English Teaching

2.1 Generation of Personalized Learning Decision-Making Ability

The essence of learner autonomy is the exercise of students' agency in the process of cognitive construction. Based on their language proficiency, learning goals, and cognitive styles, students autonomously select appropriate learning content and dynamically adjust their learning pace. With the data analysis provided by intelligent learning platforms, students can clearly identify their weak points and proactively access personalized learning resources. This forms a closed-loop autonomous learning model of diagnosis—selection—practice—feedback. The cultivation of this ability not only enhances immediate learning efficiency but also lays the cognitive

foundation for lifelong learning [1].

2.2 Active Participation in Diverse Learning Scenarios

Autonomous learners break through the spatial and temporal limitations of the classroom to build a multidimensional learning network. In the classroom, they deepen their language application through interactive activities such as group debates and role-playing. Outside the classroom, they expand their knowledge boundaries with English podcasts and academic databases. Online, they engage in real-time communication with global learners through learning communities. This participatory learning is characterized by 'problem-oriented' cognitive engagement. Students no longer passively receive knowledge but actively initiate inquiries and co-construct meaning through collaborative dialogue. For example, in thematic teaching on ecocriticism, students organize online reading groups to analyze environmental ethics in English literary works from the perspective of ecocritical theory, forming in-depth thinking across texts and disciplines [2].

2.3 Strategic Construction and Integration of Learning Resources

Confronted with a vast amount of digital resources, autonomous learners need to possess metacognitive abilities for information filtering, reorganization, and transformation. They use AI tools (such as Grammarly for grammar checking and DeepL for terminology translation) to optimize language output, employ knowledge graphs (like MindNode for building thematic associations) to integrate fragmented information, and leverage learning management systems (LMS) to create phased plans (such as daily vocabulary memorization quotas and weekly writing task breakdowns).When preparing for an English speech, students may strategically combine multiple modalities of resources. For example, they might use the TED speech corpus for language input, the Oral Roberts intelligent voice assessment system for pronunciation correction, and Canva for visualization tools (PPT design). This forms a strategic combination of multimodal resources. The core of this ability is to transform technological tools into 'scaffolding' for cognitive extension, rather than merely using them as auxiliary means [3].

2.4 Internalization and Adjustment of Metacognitive Strategies

The proficient use of metacognitive strategies is a deep mark of autonomous learning. Learners are able to monitor, evaluate, and adjust their own learning processes. This is specifically manifested in the following ways: creating flexible learning plans, applying cognitive strategies to overcome language barriers, recording the learning journey through reflective journals, and optimizing methods after phased tests. Educational psychology research has shown a significant positive correlation between the improvement of metacognitive abilities and the effectiveness of autonomous learning [4]. AI technology can provide real-time feedback on learning trajectories, offering data support for strategy adjustment.

2.5 Challenges of Autonomous Learning and the Cultivation of Cognitive Resilience

Although technology has empowered autonomous learning by creating favorable conditions, its implementation still faces multiple challenges. In the digital age, information overload can lead to choice anxiety. The lack of supervision tests students' self-discipline, and pragmatic errors in cross-cultural communication can cause anxiety [5]. Strategies to address these challenges include: Cultivating 'digital literacy' through educational technology courses. This involves assessing the credibility of information and the appropriateness of tool selection. Utilizing AI-driven learning assistants (such as the learning planning function of Chat GPT) to provide real-time guidance. Enhancing learning motivation and social support through interdisciplinary collaborative projects. For example, students can jointly develop English learning mini-programs with computer science majors.

3. Teaching Empowerment Pathways through the Integration of AI and Interdisciplinary Approaches

3.1 AI Technology Reconstructs the Language Learning Ecosystem

3.1.1 Precision Learning Support System

Intelligent platforms based on machine learning (such as Duolingo and Quizlet) analyze the learning data of millions of users to construct dynamic capability models. The system automatically identifies students' zones of proximal development (such as vocabulary bottlenecks and grammatical weaknesses) and pushes micro-courses (5-10 minute videos) and adaptive exercises (intelligent repetition of incorrect questions). For example, for students struggling with writing, AI text analysis tools can diagnose logical flaws and generate personalized suggestions for improvement. This 'personalized' support model breaks the limitations of traditional standardized teaching, providing each student with a learning experience that matches their cognitive rhythm [6].

3.1.2 Real-Time Interactive Intelligent Tutoring System

Natural language processing (NLP) technology has given rise to a new generation of learning companions — AI chatbots (such as New Bing and DeepSeek). These tools can not only instantly answer explicit questions about grammar and vocabulary but also simulate real language scenarios to train students' pragmatic abilities through multi-turn dialogues [7]. For example, during a job interview simulation with AI, the system assesses communication strategies based on the content of the answers and provides feedback reports. This immersive interaction compensates for the limitations of traditional classroom interaction in terms of time and space, creating a *24/7* language practice environment.

3.1.3 Multidimensional Language Assessment System

AI technology has shifted assessment from *summative* to *formative*: Speech recognition technology (such as iFLYTEK's oral evaluation) can precisely analyze pronunciation errors in terms of pitch, intonation, and linking, generating visual pronunciation charts; text generation models (such as GPT-4) can assess the coherence, lexical richness, and argument depth of writing, and even predict potential academic integrity risks. More importantly, AI assessment not only provides scores but also offers a 'capability growth curve' through learning trajectory analysis, enabling students to clearly identify their progress and areas for improvement [7].

3.2 Interdisciplinary Integration Expands the Dimensions of Language Learning

3.2.1 Technological Integration of Computer Science and Language Teaching

Interdisciplinary teams are currently exploring innovative applications of 'educational technology + language learning' [8]: developing English virtual laboratories based on the Unity engine, where students complete specific tasks in a 3D environment, integrating listening, speaking, reading, and writing skills; using blockchain technology to build learning credential chains that record students' achievements on different platforms, forming a traceable proof of capability. Additionally, computational thinking can be transferred to language learning strategies—for example, mapping the "loop iteration" algorithm to the "spaced repetition" method for vocabulary memorization and applying 'conditional judgment' logic to the contextual selection of grammatical rules, cultivating students' dual capabilities in *computational thinking* + *language thinking*.

3.2.2 In-depth Interdisciplinary Integration of Cultural Studies and Language Teaching

Language is a carrier of culture and a bridge for cross-cultural understanding. Integrating English teaching with disciplines such as cultural anthropology and comparative literature can deepen students' understanding of the cultural logic behind language. In thematic teaching on gender studies, analyzing the construction of gender discourse in English literary works and exploring the relationship between language use and power through sociolinguistic theories. In a technology ethics course module, comparing the rhetorical differences in Sino-English technology news reports and guiding students to consider how language shapes the public's perception of technology. This interdisciplinary perspective not only enhances the appropriateness of language use but also cultivates students' cultural sensitivity and critical thinking [9].

3.2.3 Theoretical Resonance between Educational Psychology and Language Teaching

Based on Self-Determination Theory (SDT), AI learning platforms motivate students through a "goal setting-autonomous choice-achievement feedback" mechanism.

Students can define their own learning badges (such as Grammar Master or Vocabulary Tycoon), unlock rewards by completing challenging tasks, and form a psychological satisfaction cycle of *autonomy-competence-relatedness*. Cognitive Load Theory (CLT) guides the design of learning resources — AI systems automatically identify high-difficulty content and use visualization tools to reduce intrinsic cognitive load, allowing students to devote more energy to deep meaning construction. This "technology empowerment + theory-supported" model provides a scientific pathway for the cultivation of autonomous learning abilities [10].

4. Innovative Practices of Learner Autonomy Teaching Models

4.1 Construction of AI-Driven Blended Teaching Models

4.1.1 Dual-Driven *Online Resource Pool + Offline Inquiry Workshop*

Online platforms (such as Chaoxing Learning and Blackboard) build dynamic resource libraries, integrating MOOC videos (e.g., MIT Open Course Ware English courses), links to academic databases (e.g., PubMed for medical English literature), and AI assessment tools (e.g., Write Check for plagiarism detection and writing suggestions). Students can subscribe to learning modules based on their needs. Offline classrooms are transformed into inquiry workshops: Teachers set interdisciplinary topics (such as "Comparative Discourse Analysis of AI Ethics in Chinese and English Media"), and students work in groups to collect materials (using AI literature search tools), argue viewpoints (with the help of mind-mapping software), and present their findings (creating interactive PPTs). Teachers act as cognitive coaches to provide strategic guidance [11]. In this model, online learning addresses the acquisition of knowledge (what it is), while offline inquiry focuses on the transformation of abilities (how to use it), forming a deep cognitive cycle of *input-processing-output*.

4.1.2 Deep Integration of Intelligent Grouping and Dynamic Collaboration

AI algorithms group students based on their language proficiency, learning styles, and interest tags, ensuring a ‘heterogeneous and complementary’ collaborative ecosystem in each group[12]. For example, in a cross-border e-commerce English project, AI groups students with strong language skills and those with business knowledge together to complete tasks such as writing English product descriptions and simulating cross-border e-commerce platform operations. During the process, the intelligent system monitors group interaction data in real-time and generates collaboration efficiency reports, allowing teachers to intervene with guidance (adjusting roles, resolving conflicts). This "technology-empowered collaborative learning" not only enhances language application abilities but also cultivates interdisciplinary teamwork literacy.

4.1.3 Data-Driven Assessment and Feedback Mechanism

A *three-dimensional assessment system* is constructed, covering online learning trajectories, offline performance, and AI-generated formative assessments. Assessment results are fed back in real-time through a visual dashboard, allowing students to clearly see their scores in each dimension and compare them with their peers. More importantly, the system automatically generates improvement plans based on the assessment data [13]. For example, if a student is found to have insufficient use of academic vocabulary, the system will push a learning package of 1000 High-Frequency Academic English Words and set weekly progressive goals. This closed loop of *assessment-diagnosis-intervention* ensures targeted learning improvement.

4.2 In-depth Design of Interdisciplinary Thematic Discussion Activities

4.2.1 Interdisciplinary Nature of Topic Selection

Design *Language + X* composite topics that require students to integrate language knowledge with theories from other disciplines (such as the equivalence principle in translation studies, or the carbon cycle concept in environmental science) for argumentation[14]. For example, in a discussion on English Dissemination in the Metaverse, students need to combine the characteristics of virtual worlds from computer science and the theory of media

richness from communication studies to analyze the usage norms and cultural adaptability of English in metaverse scenarios, forming an interdisciplinary cognitive framework.

4.2.2 AI-Assisted Optimization of Discussion Processes

Before the discussion, AI tools quickly retrieve relevant academic viewpoints from the entire web to generate a topic knowledge graph, helping students build a theoretical foundation for the discussion. During the discussion, an intelligent voice transcription system records the content of the speeches in real-time, automatically extracts key viewpoints, and performs sentiment analysis. Teachers can adjust the discussion pace based on this information. After the discussion, AI generates a summary report of viewpoints, highlighting the innovative points and logical flaws of each group, providing references for subsequent learning. This technology-mediated in-depth discussion allows language practice, cognitive training, and knowledge integration to occur simultaneously [15].

4.2.3 Diversified Collaboration and Transformation of Results

Encourage students to transform the outcomes of discussions into cross-modal works: creating bilingual educational short videos (combining Canva design and AI voice synthesis technology), compiling cross-cultural case manuals (using Tableau for data visualization), and developing simple English learning mini-programs (in collaboration with computer science students)[4]. For example, after a discussion on International Dissemination of Intangible Cultural Heritage, a student team designed an English tour APP for Chinese paper-cutting art. The APP includes voice narration (AI-generated in multiple accents), interactive games (paper-cutting terminology spelling challenges), and virtual exhibitions (presented through 3D modeling technology), turning language learning outcomes into real cross-cultural communication practices.

5. Conclusion and Prospects

The integration of AI and interdisciplinary approaches has provided unprecedented technological dividends and theoretical resources for the cultivation of learner autonomy in college English. Through precision learning support, interdisciplinary context building, and intelligent academic collaboration, students have transformed from knowledge consumers to meaning constructors. Their autonomous learning abilities have been enhanced through a spiral upward process empowered by technology and cognitive challenges. However, in practice, it is necessary to be vigilant about the risks of technological dependence (weakening of autonomous thinking due to over-reliance on AI corrections) and the problem of disciplinary patchwork (interdisciplinary design that is merely a formal integration). Future research could focus on the following directions: developing AI learning companions with greater emotional intelligence, exploring the application of brain-computer interface technology in language cognition research, and constructing a three-dimensional evaluation system of language ability-interdisciplinary literacy-digital competence.

The ultimate goal of college English teaching is to cultivate "lifelong learners" who can proficiently use English and possess autonomous learning abilities and global competence. In the new wave of education integrating AI and interdisciplinary approaches, only by adhering to the principle of "technology empowering people" and continuously deepening the "student-centered" teaching reform can we truly achieve the paradigm shift from *teaching English* to *learning and creating with English*. This will help to cultivate more high-quality talents with Chinese cultural roots and an international perspective for the globalized era.

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