AI-Empowered College English Teaching in Agricultural Universities

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Abstract: Addressing the challenges in traditional college English teaching at agricultural universities, such as limited teaching methods, disconnect from regional agricultural needs, and insufficient personalized attention, this paper explores pathways to enhance teaching quality and cultivate bilingual, application-oriented talent suited for regional agricultural development. These pathways include building an intelligent learning platform tailored to regional needs, developing virtual reality teaching resources based on regional agricultural scenarios, constructing an intelligent assessment system incorporating regional evaluation indicators, and conducting targeted faculty training. This research holds significant implications for promoting the deep integration of artificial intelligence (AI) with college English teaching in agricultural universities and advancing regional agricultural industry development.

***Keywords*:** artificial intelligence (AI); agricultural university; college English; teaching reform; regional agriculture

1. Introduction

1.1 The Rise of AI and its Applications in Education

Artificial intelligence (AI) technologies are rapidly advancing, with breakthroughs in machine learning, natural language processing, speech recognition, and computer vision. China has achieved significant progress in AI, with technologies like big data, knowledge graphs, and deep learning now prevalent in education, transforming both student learning and teacher roles.

AI offers substantial potential in education, providing precise teaching decision support through learning behavior data analysis, personalized resource recommendations, and comprehensive learning evaluation. These capabilities optimize the learning experience and enhance educational quality.

1.2 The Importance and Challenges of College English in Agricultural Universities

College English is crucial for cultivating internationally-minded professionals in agricultural universities, impacting students' ability to participate in global agricultural exchange, learn about cutting-edge knowledge, and support regional agricultural development. The College English Teaching Guide (2020 Edition) emphasizes its role as a core public foundation course for non-English majors.

However, college English teaching in agricultural universities faces challenges: limited resources, varied student English levels, a weak connection to regional agriculture, and simplistic evaluation. For example, Zhongkai University of Agriculture and Engineering, primarily draws students from rural Guangdong with weaker English skills. Teaching must address these deficiencies while fostering a passion for agriculture [1].

1.3 The Value of AI-Empowered College English Teaching in Agricultural Universities

Researching AI-driven college English teaching in agricultural universities is valuable for improving teaching and enhancing quality. By exploring AI applications, issues like resource scarcity and limited methods can be addressed. Integrating regional agricultural content into intelligent resources enhances relevance, while AI-based personalized learning addresses proficiency differences. Diversified AI-enabled evaluation provides a comprehensive assessment of students' English abilities [2].

The Ministry of Education's Guiding Professional Catalog for Emerging Agricultural Talents (2022) mandates that agricultural universities focus on rural revitalization and cultivate urgently needed talent to serve national and regional needs. This requires a reimagining of college English objectives, content, and methods, situating reform within the context of national strategic priorities.

2. Current State and Challenges of AI Integration in College English Teaching at Agricultural Universities

2.1 Limitations of Traditional Teaching Models in Agricultural Universities

Traditional college English teaching in agricultural universities is often lecture-based, with a "spoon-feeding" approach that limits active learning and practical application. This unidirectional knowledge transfer model struggles to engage students, resulting in passive participation and a dull classroom atmosphere. For example, New Horizon College English , while aiming for language and cultural integration and intercultural competence, often results in teacher-led text analysis, limiting student reflection and expression.

While textbooks like New Horizon College English and New Era College Advanced English offer strong language and cultural content, they lack connection to local agricultural contexts like lychee cultivation or aquaculture in our agricultural university in Guangdong. Greater emphasis is needed on professional English applications to connect regional agriculture with practical needs. As general textbooks cannot comprehensively cover every region, agricultural universities require additional resources to bridge English knowledge with students' future agricultural careers, increasing relevance and practicality. In this context, reforms are needed in teaching methods, specialized resources, cultural communication, and diversified assessment to better address individual learning needs and professional development.

College English teachers in agricultural universities face large classes, limited time, and heavy workloads, making it difficult to cater to diverse student needs, especially for those with weaker foundations. In traditional models, providing personalized guidance is challenging, limiting overall teaching effectiveness.

2.2 The Potential and Opportunities AI Technology Brings to College English Teaching in Agricultural Universities

AI can optimize teaching content by efficiently integrating regional agricultural resources, providing teachers with easy access to relevant English literature, videos, and case studies on topics like crop cultivation and animal husbandry. AI not only improves resource access but reshapes teaching roles by precisely matching regional agricultural context with student needs, enhancing relevance and practical value.

Data-driven analysis facilitates personalized teaching by dynamically tracking student learning behaviors, analyzing cognitive traits, and informing differentiated instruction. Intelligent recommendation systems and contextualized learning [3] address the issue of uneven learning outcomes due to varying student backgrounds.

AI-assisted tools, such as chatbots, translation systems, and speech recognition, expand learning support beyond the classroom [4]. The integration of these tools enhances teacher-student interaction and provides the foundation for intelligent, personalized learning environments.

3. Strategies for AI-Empowered College English Teaching in Agricultural Universities

3.1 Intelligent Learning Platform for Personalized Learning

An intelligent learning platform integrates regional agricultural English resources (e.g., vocabulary, literature, case studies) using AI. It customizes content to match local industries like aquaculture and horticulture, ensuring up-to-date language skills and agricultural technology knowledge.

A dynamic resource update mechanism incorporates international agricultural news and scientific reports, creating a "language-industry-technology" knowledge network. AI facilitates continuous resource updates, providing students with a global perspective and linking teaching resources with regional needs.

Learning behavior modeling personalizes learning through machine learning analysis of student data. The system identifies individual cognitive differences and knowledge gaps and generates tailored training plans based on English proficiency, learning style, and academic major.

Hierarchical adaptation enhances learning effectiveness. The platform incorporates adaptive assessments and intelligent feedback, guiding students to optimize their learning strategies. This data-driven approach [4] increases engagement and improves the integration of English and cultural understanding, resulting in sustainable skill development.

3.2 Immersive Learning with VR Resources Based on Regional Agriculture

Cross-modal perception technology supports the creation of agricultural scenario-based teaching environments. Integrating VR/AR with regional production data constructs virtual training areas across the agricultural chain, such as planting and breeding sites. Digital twins of agricultural product production enable students to master English terminology

for seed selection and field management in realistic simulations, linking language skills with practical operations.

Full-process virtual modeling replicates the agricultural chain from breeding to sales. Modules with 3D visualizations of pest control and interactive product processing allow students to gain targeted communication strategies, improving the practical application of English in regional agricultural contexts.

Multi-modal interaction activates immersive language practice through role-playing and intelligent dialogue systems for scenarios such as agricultural technology promotion and international exhibitions. Virtual tour guides lead bilingual explanations of crop cultivation and cross-border marketing negotiations. Immediate feedback and error correction enhance English application abilities.

Cognitive-contextual synergy enhances language transfer. Immersive VR environments translate English knowledge into practical skills through multi-sensory stimulation and task-driven learning. This AI-driven model optimizes pragmatic cognition and fosters a positive cycle of "scenario memory-skill transfer-ability internalization" [6].

3.3 Intelligent Assessment System with Regional Evaluation Indicators

Moving beyond single-dimensional evaluations, a competency-based assessment model incorporates international agricultural exchange and bilingual research report writing. This system prioritizes English application in regional agricultural scenarios, quantifying language performance in tasks like cross-border cooperation and technology promotion, shifting assessment from knowledge to practical skills.

A three-dimensional evaluation structure guides competency development. The system integrates instrumental, innovative, and adaptive dimensions, forming a "language foundation-scenario application-problem-solving" framework that positions English as a tool for agricultural development and aligns assessment with regional talent needs.

Multi-modal data fusion powers the intelligent assessment matrix. An AI system uses natural language processing and speech recognition to analyze language behaviors in virtual scenarios. Through modules like pronunciation feature databases and discourse analysis models, the system provides a comprehensive assessment from basic linguistic elements to advanced communicative competence.

A dynamic feedback mechanism drives continuous teaching improvement by generating personalized competency profiles and improvement suggestions. Based on learning data analysis, the system provides teachers with reports visualizing class competency weaknesses, enabling targeted teaching adjustments and a data-driven quality assurance system [7].

3.4 Targeted Faculty Training for Information Literacy and Regional Agricultural Knowledge

To better integrate AI into agricultural university English teaching, targeted faculty training is essential for enhancing information technology and application skills. Training should cover AI principles, educational applications, and the use of intelligent teaching platforms.

A Faculty Intelligent Education Capacity Development Project provides a foundation for technology application. Through tiered training, English teachers enhance their technical literacy in AI, intelligent platforms, and AI pedagogy. The project uses a three-stage curriculum focused on developing teachers' ability to use intelligent technology for resource development, learning analysis, and personalized guidance.

Furthermore, teachers should participate in practical research on AI-assisted teaching, exploring innovative applications like developing intelligent resources and activities and building intelligent evaluation systems. This improves their ability to solve teaching problems with AI. English teachers must adapt to changing methods and use AI to optimize teaching.

College English teachers need strong language and teaching skills and an understanding of regional agricultural development. This can be achieved through visits to agricultural enterprises, expert lectures, and participation in research projects, enhancing their knowledge of regional agriculture.

Interdisciplinary collaboration between college English and agricultural specialists is encouraged. Using AI, they can jointly develop resources, design activities, and guide student practice, integrating English and agricultural education into a "English+Agriculture+Artificial Intelligence" training model. This integration aligns English teaching with regional agricultural needs. Optimal outcomes require constructively combining AI technology and traditional teacher-student interaction.

4. Conclusion

The integration of artificial intelligence into college English teaching at agricultural universities, through intelligent learning platforms, virtual reality scenarios, and smart assessment systems, effectively addresses the limitations of traditional methods, such as monotonous teaching, a disconnect from regional agriculture, and a lack of personalization. These technologies facilitate the deep integration of resources and regional agricultural context, enhancing the practicality

and relevance of English teaching and supporting the development of bilingual, application-oriented graduates tailored for regional agricultural advancement.

Future development will concentrate on the deep integration of AI across the teaching process, the development of regional agricultural scenario-based resources, the widespread adoption of personalized learning, and data-driven teaching optimization. Further research should focus on intelligent development of agricultural resources, personalized learning practices, intelligent assessment design, and enhancing teachers' technology skills to foster collaborative innovation in English teaching and regional agricultural development, ultimately establishing the "English + Agriculture + Artificial Intelligence" Zhongkai talent development model.

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