


Intelligence-Driven Multi-Dimensional Collaborative Model for Blended University English Teaching: Design, Implementation, and Effectiveness Evaluation Based on Digital Web Technologies

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ABSTRACT

Against the transformation of higher education via digital technologies, traditional university English teaching faces challenges such as limited teacher–student interaction and single evaluation methods. This study integrates web-based technologies into blended teaching, proposing an intelligence-driven multidimensional collaborative model that builds a three-way interaction system of teachers, artificial intelligence platforms, and resource repositories to realize real-time learning behavior collection, personalized recommendations, and closed-loop feedback. Through a 16-week quasi-experiment, indicators including online duration, resource adoption rate, exam scores, and satisfaction were analyzed. Results showed the experimental group had 18% higher online engagement, an average final score of 82.3 ± 5.6 , and high satisfaction with modules such as resource push. The model addresses online–offline learning disconnect and enhances precise teaching, enriching knowledge on web-based technologies in language teaching and providing references for web-enabled blended learning system design.

KEYWORDS

Digital Intelligence Technology, University English, Blended Teaching, Artificial Intelligence, Teaching Innovation

INTRODUCTION

With the advancement of technology, the higher education sector is undergoing profound transformation, driven primarily by the widespread integration of digital technology and intelligent systems, which are permeating every aspect of the education field (Alenezi et al., 2023). Digital technology, with its rich array of tools such as online learning platforms, virtual classrooms, and

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interactive multimedia resources, has democratized educational resources, breaking down geographical barriers and enabling students from diverse backgrounds to access high-quality learning opportunities regardless of their location (Ngongpah & Oni, 2025). Meanwhile, intelligent systems driven by artificial intelligence (AI), big data analysis, and machine learning algorithms are revolutionizing the delivery, assessment, and optimization of educational content (Suryanarayana et al., 2024). These systems can analyze vast amounts of student data to identify learning patterns, predict academic performance, and provide personalized feedback and support, thereby enhancing the effectiveness of teaching and learning processes. Additionally, the integration of digital technology and intelligent systems is driving interdisciplinary research collaboration and innovation in higher education. Researchers are using these tools to collect, analyze, and interpret complex datasets, leading to breakthrough discoveries and advancements across multiple fields. The ongoing integration of digital technology and intelligent systems into all areas of higher education marks a paradigm shift that is reshaping the future of learning and teaching (Rodney, 2020).

University English courses, as an important vehicle for cross-cultural communication and international understanding, are undergoing a profound transformation from traditional models toward intelligent and hybrid approaches (Zhou, 2023). The restructuring of teaching spaces, changes in learning methods, and the widespread application of intelligent platforms have made personalized learning and instant feedback possible. Looking back at the current state of university English teaching over the past few years, it is not difficult to see that the field is facing many practical challenges. The limited interaction between teachers and students often hinders the establishment of meaningful relationships and personalized guidance. According to reports, only 32% of public foreign language courses in universities nationwide have effective classroom discussion sessions, and 60% of the interaction is concentrated on a few active students, with most students in a passive listening state (Yang et al., 2025).

Currently, English course evaluation methods are limited, with final exams remaining the primary assessment method, neglecting the evaluation of soft skills such as oral expression and collaborative abilities, leading to a prominent “high scores but low practical skills” phenomenon among students (Woodward, 2017). Additionally, under the traditional model, teachers struggle to capture students' behavioral characteristics during pre-class preparation and review sessions. Additionally, the difficulty in quantifying learning outcomes makes it challenging for educators to evaluate the effectiveness of teaching strategies, and students also find it hard to accurately track their own progress (Bao et al., 2021). These issues collectively point to a core contradiction: static, linear teaching models cannot align with the diverse learning needs of students in the digital age, necessitating the use of digital and intelligent technologies to reshape the educational ecosystem (Butler et al., 2018).

To address these challenges, an increasing number of universities are adopting advanced technologies such as AI, big data analysis, and smart classrooms. These innovative technologies are being used to create more dynamic and interactive learning environments tailored to students' diverse needs and preferences. For example, AI-based language learning tools can provide personalized recommendations based on individual learning styles and progress, while big data analysis can reveal patterns in student performance, enabling educators to adjust teaching strategies more precisely. Smart classrooms equipped with interactive displays and collaborative technologies can foster more engaging and interactive learning experiences, thereby enhancing student participation and motivation. The ultimate goal of integrating these technologies into university English teaching is to enhance teaching efficiency and quality through technology-enabled solutions. By automating routine tasks, providing real-time feedback, and supporting data-driven decision-making, these tools enable educators to focus more on cultivating students' critical thinking, creativity, and cultural awareness. Additionally, they help bridge the gap between theoretical knowledge and practical application, preparing students to meet the demands of the globalized workforce (Fantinelli et al., 2024; Hutter et al., 2017).

However, the complexity of deeply integrating technology with teaching, along with the need to balance the interests of multiple stakeholders, also presents significant challenges in this process

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