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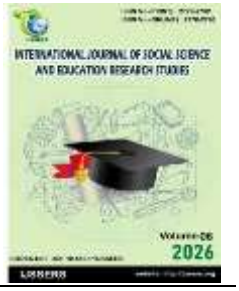

AI-Enabled Intelligent Dual-Teacher Model for English Instruction: A Theoretical Framework and Practical Application

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ABSTRACT

With the continuous advancement of artificial intelligence (AI) technologies, a growing number of AI-enabled tools and systems aligned with pedagogical needs have emerged, substantially expanding the scope of AI applications in the educational domain. This development has not only driven the evolution of related technologies and industries but has also created new possibilities for the integration of the intelligent dual-teacher model with deep and high-quality instruction. Against the backdrop of the ongoing transition from the "Internet+" paradigm to the "Artificial Intelligence+" paradigm, technological innovations in AI are exerting a profound and transformative influence on contemporary teaching environments and instructional practices. Looking ahead, education is increasingly required to operate in close synergy with AI technologies and to explore innovative models of intelligent dual-teacher classroom instruction. Focusing on the English subject, this study investigates the construction of an AI-enabled intelligent dual-teacher classroom model, with the aim of fully leveraging the complementary instructional strengths of human teachers and AI systems. It is expected that this model will inject new momentum into educational reform and development, facilitate the implementation of personalized instruction, and ultimately promote students' holistic development.

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KEYWORDS:

Artificial intelligence in education; Intelligent dual-teacher model; English instruction; Intelligent classroom; Personalized learning; Educational innovation

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1. INTRODUCTION

The rapid advancement of artificial intelligence (AI) technologies has profoundly reshaped contemporary educational landscapes, giving rise to new instructional paradigms that extend beyond traditional technology-assisted teaching. In recent years, the emergence of the “AI+Education” paradigm has prompted educators and researchers to reconsider the roles of teachers, technologies, and learners in classroom

contexts, particularly with regard to personalization, adaptivity, and learner-centered instruction (UNESCO, 2023; Holmes & Tuomi, 2023). Rather than functioning merely as auxiliary tools, AI systems are increasingly positioned as active participants in instructional processes, capable of generating feedback, analyzing learning data, and supporting pedagogical decision-making.

Within language education, and English as a Foreign Language (EFL) instruction in particular, AI-enabled technologies have demonstrated considerable potential in supporting pronunciation practice, speaking fluency, formative assessment, and individualized learning pathways (Edmett, 2023; Tan et al., 2024). However, existing applications of AI in English classrooms often remain fragmented, focusing on isolated functions such as automated assessment or conversational agents, while insufficient attention has been paid to the systematic orchestration of human teachers and AI systems within coherent instructional models. As a result, the pedagogical integration of AI frequently lacks theoretical grounding and operational clarity, limiting its transformative impact on classroom practice.

Against this backdrop, the concept of the intelligent dual-teacher model has attracted growing scholarly interest. This model conceptualizes classroom instruction as a collaborative process jointly enacted by human teachers and AI-based instructional agents, each contributing complementary strengths. Human teachers are responsible for pedagogical judgment, classroom orchestration, ethical guidance, and the cultivation of higher-order thinking skills, whereas AI systems provide data-driven insights, adaptive feedback, and scalable personalized support. Such a division of labor aligns with emerging perspectives on hybrid intelligence and human-AI collaboration in education (Kong et al., 2025).

Despite its conceptual appeal, existing research on intelligent dual-teacher classrooms remains underdeveloped in several respects. First, many studies emphasize technological affordances without sufficiently articulating pedagogical mechanisms or instructional workflows. Second, few studies offer an integrated theoretical framework that links curriculum design, teaching processes, learning activities, and assessment practices within an AI-enabled dual-teacher environment. Third, practical guidance on classroom-level implementation is often limited, making it difficult for educators to translate abstract concepts into actionable instructional practices.

To address these gaps, this paper proposes an AI-enabled intelligent dual-teacher model for English instruction that integrates theoretical perspectives from learner-centered pedagogy, hybrid intelligence, learning analytics, and assessment-for-learning. Rather than presenting empirical findings, this study adopts a conceptual and practice-oriented approach, aiming to (1) clarify the pedagogical roles of human teachers and AI systems in English classrooms, (2) construct a coherent theoretical framework encompassing curriculum, teaching, learning, and evaluation dimensions, and (3) outline practical procedures for implementing the intelligent dual-teacher model in real classroom contexts. By doing so, the study seeks to provide a theoretically grounded and operationally feasible reference for educators and researchers exploring AI-driven innovation in English language teaching.

2. THE ROLE OF AI IN CONSTRUCTING THE INTELLIGENT DUAL-TEACHER ENGLISH CLASSROOM

2.1 Human–Machine Collaboration and Optimization of Instructional Platforms

Within the construction of the intelligent dual-teacher English classroom, AI plays a structurally significant and functionally irreplaceable role (Kong et al., 2025). The establishment of AI-supported learning spaces should not be confined to teachers' instructional planning but should permeate all phases of classroom instruction, forming a closed-loop system of instruction, feedback, and adjustment (Joe, 2025; Tan et al., 2024).

AI systems can feed students' learning performance data back to teachers in real time, thereby enabling more accurate instructional decision-making and adaptive scaffolding (Wang,

2025; Joe, 2025). In pronunciation and speaking practice, AI-based speech recognition and evaluation technologies provide individualized and repeatable training environments and can support oral skills development when aligned with pedagogy (Aliakbari et al., 2025; Fitria, 2023). From this perspective, the intelligent dual-teacher classroom offers a feasible approach to mitigating the long-standing "mute English" problem in EFL contexts (Loor, 2024).

2.2 Construction of Multidimensional Contexts and Deep Classroom Engagement

Teachers can leverage AI systems to generate pre-class learning materials and construct multidimensional, context-rich learning scenarios, which aligns with principles of situated learning and immersive learning theory (Lou, 2025; Lu, 2025). With the participation of AI-based pedagogical agents, instructional resources are no longer restricted to static presentations but can become dynamically generated and adaptive (Edmett, 2023; Wang, 2025). Research suggests that technology-supported multimodal input and contextualized materials can enhance learners' engagement and depth of cognitive processing, especially when tasks are designed for deeper learning rather than surface completion (Fitria, 2023; Lou, 2025). By continuously reconstructing instructional contexts, teachers can sustain students' attention and promote immersive language use, which is particularly beneficial for the development of oral communicative competence (Aliakbari et al., 2025).

2.3 Dialogic Equality and Positive Feedback Mechanisms

The intelligent dual-teacher classroom provides conditions for fostering more dialogic and egalitarian interaction patterns (Dilek et al., 2025). In such environments, teachers and AI systems can function as facilitators of learning rather than sole knowledge transmitters (Kong et al., 2025; Tan et al., 2024).

Immediate multimodal feedback generated by AI systems—such as points, badges, or visual indicators—can strengthen students' motivation and self-efficacy (Aliakbari et al., 2025; Gamage et al., 2022). This feedback ecology can support positive achievement emotions and sustained engagement in English learning when combined with meaningful tasks and teacher guidance (Wang, 2025; Joe, 2025).

2.4 Critical Thinking and Holistic Development

From the perspective of 21st-century competencies, the ultimate goal of intelligent classrooms lies not merely in efficiency enhancement but in the cultivation of higher-order thinking skills (Department of Education, 2024; UNESCO, 2023). Within this model, AI provides informational and analytical support, while teachers focus on guiding students' cognitive development, reflective learning, and responsible use of technology (Dilek et al., 2025; Mohammad et al., 2025).

Compared with traditional knowledge-transmission models, the intelligent dual-teacher classroom places greater emphasis on deep learning, critical inquiry, and transfer of learning (Holmes & Tuomi, 2023; Tan et al., 2024). AI-supported analytics can help identify common misconceptions and learning bottlenecks, enabling teachers to design tasks that require explanation, reasoning, and language use for authentic purposes (Joe, 2025; Lu, 2025).

3. THEORETICAL FRAMEWORK FOR AN AI-ENABLED INTELLIGENT DUAL-TEACHER ENGLISH CLASSROOM

3.1 Curriculum Model

The integration of online and offline instruction reflects the trend of blended learning and smart education (Edmett, 2023; Wang, 2025). Interdisciplinary integration aligns with contemporary curriculum integration theory and competence-based education reform (Department of Education, 2024). The data-driven nature of the model corresponds to learning analytics and evidence-based education, emphasizing that instructional decisions should be informed by learner data and validated outcomes (Joe, 2025; Kong et al., 2025).

3.2 Teaching Model

The four principles—intelligence, process orientation, intelligent interaction, and flexibility—are consistent with learner-centered pedagogy and adaptive instruction (Fitria,

2023; Loor, 2024). AI-supported real-time diagnosis can partially compensate for the cognitive and managerial limits of individual teachers by providing timely analytics and recommendations (Kong et al., 2025; Tan et al., 2024). At the same time, classroom orchestration remains a central human responsibility, requiring teachers to coordinate activities, tools, and interactions in real time (Dilek et al., 2025).

3.3 Learning Model

The convergence of formal and informal learning reflects theories of lifelong and ubiquitous learning (Holmes & Tuomi, 2023). Personalized learning paths supported by AI align with self-regulated learning theory and adaptive learning systems (Aliakbari et al., 2025; Wang, 2025). AI tools can support goal setting and self-monitoring, while teachers scaffold metacognitive reflection and strategy transfer (Lou, 2025).

3.4 Evaluation Model

The shift from summative to formative and process-oriented assessment is consistent with assessment-for-learning theory (Joe, 2025; UNESCO, 2023). AI-supported learning analytics can enable fine-grained, longitudinal, and comparatively objective evaluation of learning processes (Tan et al., 2024; Wang, 2025). Evidence from multiple sources (tests, portfolios, logs, observations) can be triangulated to improve validity and reduce overreliance on any single metric (Kong et al., 2025).

4. PRACTICAL IMPLEMENTATION OF THE AI-ENABLED INTELLIGENT DUAL-TEACHER ENGLISH CLASSROOM

4.1 Technical Preparation

The construction of an AI-enabled intelligent dual-teacher classroom is predicated on adequate technical infrastructure and imposes requirements on schools' software and hardware environments (Lu, 2025; Wang, 2025). Classroom display systems can be designed as single-screen or dual-screen configurations, with dual screens enabling the simultaneous presentation of instructional content and extended learning resources or analytics (Lou, 2025; Loor, 2024).

Some advanced instructional platforms may incorporate green-screen or mixed-reality technologies, enabling AI-based pedagogical agents (e.g., avatars) to be projected into classroom scenarios and interact with students in more immersive ways (Lou, 2025). Research indicates that immersive technologies can support motivation and learning when instructional design manages cognitive load and ensures alignment with learning goals (Lu, 2025; Makransky et al., 2022).

4.2 Operational Procedures

In the intelligent dual-teacher classroom, teachers first upload instructional resources and course materials (e.g., videos, presentation slides, texts) to an AI teaching platform, reflecting a common workflow of AI-supported instructional systems (Edmett, 2023; Joe, 2025). During classroom instruction, teachers and AI systems interact according to a predesigned instructional script, engaging in questioning, demonstration, and content presentation, consistent with orchestrated human–AI collaborative teaching (Kong et al., 2025; Wang, 2025).

Throughout the instructional process, the AI system automatically collects data on students' classroom performance and learning behaviors and generates adaptive suggestions regarding instructional difficulty and pacing (Joe, 2025; Tan et al., 2024). Teachers can then adjust instructional progress and content sequencing based on these recommendations. Sufficient time should also be allocated for students to interact directly with the AI system, as learner–system interaction can enhance engagement and learning efficiency when embedded into well-designed tasks (Aliakbari et al., 2025; Fitria, 2023).

4.3 Effectiveness Evaluation

Evaluation of the intelligent dual-teacher classroom should consider multiple indicators, including student participation and engagement, performance on assignments and tests, AI-generated learning analytics, and students' subjective feedback, consistent with contemporary multidimensional evaluation approaches (Department of Education, 2024; Joe, 2025). When ethically and legally permissible, AI systems may also analyze

eye movements and facial expressions to infer learners' affective states and engagement during classroom interactions (Dilek et al., 2025; Mohammad et al., 2025).

By integrating assignment performance and test results, AI systems can quantify learning gains and estimate the instructional impact of the intelligent dual-teacher model on English proficiency over time (Wang, 2025). Teachers can also use learning analytics to track learners' behavioral trajectories and progress patterns longitudinally (Kong et al., 2025). Through visualization of learning data, teachers can obtain an intuitive understanding of student progress and difficulties, providing an empirical basis for continuous instructional optimization (Tan et al., 2024; UNESCO, 2023).

5. CONCLUSION

The accelerating development of artificial intelligence technologies has placed English language education at a critical juncture, where traditional instructional paradigms are increasingly challenged by demands for personalization, adaptivity, and deeper learning. In response to these challenges, this paper has proposed an AI-enabled intelligent dual-teacher classroom model that reconceptualizes classroom instruction as a collaborative endeavor between human teachers and AI systems.

By integrating perspectives from curriculum theory, learner-centered pedagogy, hybrid intelligence, and assessment-for-learning, the proposed model offers a comprehensive framework encompassing curriculum design, teaching processes, learning pathways, and evaluation mechanisms. Within this framework, AI systems function as data-driven instructional partners that support diagnosis, feedback, and personalization, while human teachers retain central responsibility for pedagogical judgment, classroom orchestration, ethical considerations, and the cultivation of higher-order cognitive and communicative competencies. This complementary division of labor highlights that effective AI integration in English instruction depends not on technological substitution, but on pedagogically informed human–AI collaboration.

The primary contribution of this study lies in its systematic articulation of an intelligent dual-teacher model that bridges theoretical abstraction and classroom-level practice. Unlike fragmented applications of AI tools, the proposed model emphasizes instructional coherence and practical feasibility, offering educators a structured pathway for implementing AI-supported English instruction. Although the model has not been empirically validated within this study, it provides a conceptual foundation upon which future research can build.

Future studies may extend this work by empirically examining the effectiveness of the intelligent dual-teacher model through classroom-based experiments, case studies, or mixed-methods research. In particular, longitudinal investigations into learners' language development, engagement, and self-regulated learning within AI-enabled dual-teacher environments would further enrich understanding of its pedagogical value. Additionally, ethical considerations related to data privacy, algorithmic bias, and teacher agency warrant continued scholarly attention.

In conclusion, the AI-enabled intelligent dual-teacher classroom represents a promising direction for the transformation of English language instruction in the AI era. By foregrounding pedagogical principles and human agency alongside technological innovation, this model contributes to ongoing discussions on sustainable and responsible integration of artificial intelligence in language education.

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