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Original Research Article

The effectiveness of AI-based classroom activity design in college English instruction in China

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Abstract: With the acceleration of educational digital transformation and the deepening of college English teaching reform, artificial intelligence (AI) technology has provided a new practical path for classroom activity design. Taking college English teaching in China as the research scenario, this paper focuses on AI-driven classroom activity design. By analyzing its core characteristics and teaching adaptability, it explores its effectiveness in enhancing learning participation, realizing personalized teaching, and optimizing the evaluation system, while examining practical challenges such as insufficient technology adaptation, homogeneous activities, and inadequate teacher literacy. On this basis, it proposes optimization paths including a "technology-goal-discipline" three-dimensional adaptation framework, a teacher literacy improvement system, and data ethics norms. The study holds that AI-based classroom activity design must take teaching goals as the core and balance technology application with the essence of teaching to provide sustainable support for improving the quality of college English teaching.
Keywords: artificial intelligence (AI); classroom activity design; college English teaching; teaching effectiveness; personalized learning

1. Introduction

Driven by the Educational Informatization 2.0 Action Plan, college English teaching in China is transitioning from an "exam-oriented" approach to one focused on "comprehensive competence development." This transformation urgently requires overcoming the limitations of traditional teaching, such as being "teacher-centered," "one-way transmission," and "neglecting individual differences." Artificial intelligence (AI) technology, with its core capabilities in adaptive learning, intelligent interaction, and big data analysis, injects new momentum into classroom activity design—Ranging from AI virtual foreign teacher oral conversation simulations, to writing feedback from intelligent correction systems, to the adaptive platform's task layering. AI is gradually reshaping the interactive forms and teaching logic in college English classrooms.

2. Core connotations of AI classroom activity design and college English teaching

2.1. Definition and characteristics of AI classroom activity design

AI classroom activity design is a teaching system based on artificial intelligence technologies, including adaptive learning systems, intelligent assessment tools, virtual interactive platforms, and generative AI tools. These technologies aim to integrate with college English teaching goals to promote the mastery of language knowledge, the enhancement of comprehensive skills, and the cultivation of cross-cultural communication abilities. This teaching activity system features data-driven approaches, personalized adaptation, and multimodal interaction. The core is not just the integration of technology but, more importantly, the deep fusion of technology with teaching goals[1].

One key characteristic of AI classroom activity design is personalized adaptation. AI dynamically adjusts the difficulty and content of activities by real-time collection of students' learning data, such as vocabulary accuracy, listening comprehension speed, and types of writing errors. For example, for students at the CET-4 level, the AI system will push reading materials containing 3,000 to 4,000 core vocabulary words, while for CET-6 students, it

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will recommend texts with over 5,000 vocabulary words, involving specialized fields like technology or business, truly providing tailored teaching.

Another significant feature is multimodal interaction, which breaks through the traditional model of text and blackboard. AI integrates multiple modes, such as speech, images, and virtual scenarios, to provide a richer interactive experience. For instance, in business English teaching, AI can simulate a "cross-border negotiation" scenario where students engage in dialogue with virtual characters. The system can instantly assess the accuracy of students' pronunciation and the logical flow of their expressions, offering real-time feedback to help students continually improve. Additionally, AI classroom activity design also has contextual construction, utilizing Virtual Reality (VR) or Augmented Reality (AR) technologies to restore authentic language use scenarios. In cross-cultural communication teaching, AI can present situations such as "international conference etiquette" or "multinational team collaboration," where students choose English expressions that conform to target cultural norms, thereby enhancing their cross-cultural communication skills through practice.

2.2. Effectiveness requirements of AI activity design in college English teaching

The "College English Teaching Guidelines" clearly state the goal of "cultivating students' comprehensive application ability in English, especially their listening and speaking abilities." This goal presents three core requirements for AI classroom activity design:

Breaking the Limitations of "Scale Teaching": In traditional classroom teaching, it is difficult for teachers to meet the needs of students with different levels of ability — Students with weaker foundations may give up if they cannot keep up, while stronger students may lose interest due to overly simple content. AI activity design should use layered tasks (e.g., vocabulary activities divided into "basic memory - application practice - extended creation") to achieve personalized teaching for each student.

Strengthening "Skill-Oriented" Practice: College English teaching needs to shift from "knowledge transmission" to "skills training." However, traditional activities (e.g., text reading, grammar explanation) often fail to provide sufficient opportunities for practice. AI activities should focus on core skills such as speaking, listening, reading, and writing. For example, in speaking activities, AI can evaluate fluency and pronunciation accuracy, while in listening activities, AI can use speech recognition to identify weak areas, such as news listening or long dialogues[2].

Adapting to "Blended Teaching" Scenarios: In the post-pandemic era, blended teaching (a combination of online and offline) has become the norm. AI activity design should accommodate both scenarios: online, it can facilitate "asynchronous dialogue practice" through virtual interactive platforms, while offline, it can support "group collaborative writing" using AI-assisted equipment (e.g., smart whiteboards), ensuring seamless integration of teaching environments.

3. Effectiveness and practical challenges of AI-based classroom activity design in college English teaching

3.1. Effectiveness of AI classroom activity design

The application of AI technology in classroom activities is increasingly becoming an important force in educational transformation, especially showing significant effectiveness in college English teaching. As technology continues to advance, AI can help teachers and students break through the limitations of traditional teaching models, achieving more personalized and intelligent teaching activities, significantly enhancing teaching effectiveness.

AI technology stands out in enhancing teaching interaction. Traditional teaching methods are often teacher-centered, with low student participation and interaction, particularly in large classrooms where students' individual needs are difficult to address in a timely manner. The application of AI breaks this limitation, allowing for real-time adjustments based on students' learning progress and comprehension levels. Through intelligent teaching platforms, AI systems can collect students' learning data in real time, accurately analyze each student's mastery of the material, and tailor learning content for each student. This personalized teaching method not only improves students' learning efficiency but also greatly enhances their sense of participation in the classroom.

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Teachers, through the feedback provided by AI, can better understand each student's learning situation and adjust their teaching strategies to provide more effective guidance.

AI technology also offers significant advantages in promoting student autonomy in learning. The application of adaptive learning platforms enables students to engage in selective learning according to their own interests, needs, and learning pace. This learning model fully respects students' autonomy and personalized needs, sparking their interest in learning. In traditional teaching modes, students' learning progress is often limited by the course schedule. However, AI systems break this limitation, allowing students to learn at their own pace and access necessary resources and support at any time. The personalized learning paths provided by AI allow students to explore fields they are interested in deeply, enhancing their enthusiasm and continuity in learning English. Students can not only master the knowledge in textbooks but also expand their learning horizons by exploring related materials recommended by the system, thereby increasing the depth and breadth of their learning[3].

Furthermore, AI technology also has significant advantages in assessing learning effectiveness. Traditional classroom evaluations often rely on teachers' subjective judgment, and the assessment process is often delayed and one-sided. AI systems can monitor students' learning progress in real time and automatically analyze learning data, such as homework completion, accuracy of answers, and learning pace. This data provides teachers with comprehensive and objective feedback, helping them understand students' learning conditions in a timely manner and adjust their teaching strategies accordingly. AI's data analysis capability makes the evaluation of learning effectiveness more accurate and comprehensive, allowing teachers to dynamically adjust teaching content and methods based on daily learning data, rather than relying solely on end-of-term exam results.

3.2. Realistic challenges in AI classroom activity design

Despite the promising prospects of AI classroom activity design in college English teaching, there are many practical challenges in its promotion. One of the biggest obstacles is the insufficient popularity of technology. Although the potential of AI in education is widely recognized, many universities, especially those with relatively backward technology, still have low penetration rates of AI teaching tools. Many teachers and students are unfamiliar with these tools and lack the necessary training and technical support. In terms of hardware facilities and technical equipment, many schools have limited resources, and some even lack complete technical infrastructure, which directly affects the smooth application of AI technology in classrooms. Additionally, due to uneven educational resources, some schools are unable to provide sufficient funding and technical support for AI classroom activity design, limiting the promotion of AI teaching tools. The lag in technological adoption has slowed the implementation of AI activity design and is a key bottleneck in the current application of AI in education[4].

Another major challenge is the lack of teachers' adaptability and literacy. AI activity design not only requires teachers to have a certain level of technical literacy but also demands innovative thinking. Many teachers have accumulated extensive experience in traditional teaching methods, but they have limited knowledge of AI technology and lack the ability to integrate emerging technologies into the classroom. Older teachers, in particular, often feel confused and uncomfortable when faced with technological applications. AI activity design requires teachers to design teaching content and activities according to students' different needs and the characteristics of the technology, while also managing the operation of the classroom, which places higher demands on teachers' professional abilities.

Data privacy and ethical issues also pose challenges for AI classroom activity design. In AI teaching activities, large amounts of data about students' learning behaviors, academic performance, and personalized needs need to be collected, stored, and used. The collection, storage, and usage of these data involve issues of student privacy and personal information protection. If data management is inadequate, it could lead to privacy breaches or misuse of information, resulting in serious ethical issues. Therefore, ensuring the security and legality of the data and utilizing these data to optimize teaching without infringing on students' privacy has become a critical issue in AI teaching design. In the context of data sharing and platform cooperation, students' personal information may be accessed and used by third parties, further increasing the risk of data breaches.

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4. Practical paths for optimizing the effectiveness of AI classroom activity design

4.1. Constructing a "technology - goal - discipline" three-dimensional adaptation framework for activity design

Currently, the fragmentation of AI resources is a prominent issue, and there is an urgent need to improve the quality of resources through a "co-construction and sharing" model. To address the disconnect between technology and teaching, it is necessary to establish a three-dimensional design framework centered around teaching goals. In this framework, the teaching objectives must first be clearly defined. For college English teaching, specific AI activity goals should be set based on the characteristics of different stages. For example, in the foundational stage, the focus is on vocabulary and grammar, and an "AI Grammar Challenge" activity can be designed to help students master basic grammar; in the intermediate stage, the focus shifts to academic English or business English, and an "AI Academic Paper Abstract Writing" activity can be designed to enhance students' writing abilities. Subject adaptation is also crucial. Universities should collaborate with AI companies to jointly develop subject-specific resource libraries. For technical and engineering universities, an "AI English for Technology Reading Library" can be developed, containing texts in fields such as engineering and computer science. For liberal arts universities, a "Business English AI Negotiation Library" can be created, covering real-world scenarios like contract signing and market research, providing learning materials closely related to the discipline[5].

4.2. Establishing data security and ethical standards

Although the application of AI in classroom activity design has shown significant effects, there are still various challenges in its practical implementation that limit its widespread use. One of the main obstacles is data security issues and over-reliance on AI. To avoid potential risks, an appropriate safeguard system must be established at the institutional level. Universities need to sign clear data security agreements with AI platforms, limiting the scope of data collection to teaching evaluation and specifying the storage period for data, with anonymization applied at the end of the semester. Additionally, universities should regularly conduct data security checks to ensure the safety and compliance of data usage. Optimizing algorithms is another urgent issue. To avoid overly simplistic AI assessment standards, collaboration with research institutions should be established to continuously improve AI evaluation algorithms. For example, in oral assessments, in addition to evaluating pronunciation accuracy, the logical coherence of content should also be considered. In writing assessments, beyond evaluating grammar and expression, dimensions such as depth of thought and cultural adaptability should be added. Another important task is to guide teachers and students in the proper use of AI. It should be made clear in the teaching process that AI's role is supportive, not a replacement for students' independent thinking. For example, in writing instruction, students can be asked to complete a first draft independently and then use AI tools to check for grammatical errors, after which the teacher provides a second round of feedback, strengthening students' thinking and critical thinking skills[6].

4.3. Promoting the co-construction and sharing of AI teaching resources

Currently, the fragmentation of AI resources in the educational field is becoming increasingly severe, and there is an urgent need to improve the quality and effectiveness of these resources through a "co-construction and sharing" mechanism. To address this issue, one approach is to establish provincial-level resource libraries, led by educational departments, to integrate excellent AI activity designs, teaching materials, and case studies from universities within the province, creating a unified "College English AI Teaching Resource Library" for teachers to download and use for free. Similar provincial resource libraries already contain over 1,200 activity designs, such as "AI Oral Training" and "AI Academic Writing," which greatly facilitate access to and sharing of teaching resources. Moreover, the dynamic update mechanism of the resource library is crucial. As educational reforms progress and new courses such as "Artificial Intelligence English" and "Cross-border E-commerce English" are introduced, the resource library should be updated regularly to maintain its timeliness and adaptability. In this way, teachers can obtain the latest resources that meet current teaching needs. Additionally, inter-university cooperation in resource development is another key measure to enhance the quality of resources. By encouraging

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collaboration between different types of universities, such as technical universities and foreign language schools, to jointly develop an "AI English Listening Library for Technology," subject-specific advantages can be complemented, thus creating more diverse and efficient educational resources. This cooperation not only enhances the professionalism of the resources but also promotes the sharing and optimization of various educational resources[7].

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