

Research on Adaptive English Teaching Mode with ChatGPT and VR Technologies

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Abstract: In the era of generative Artificial Intelligence, digital teaching has become an inevitable trend. Since the official release of ChatGPT technology last year, how to use ChatGPT to assist teaching has become a hot topic in the field of education. The teaching mode integrating ChatGPT and VR technologies emphasizes social elements, provides students with diverse learning experiences, meets individualized learning needs, and overcomes some shortcomings of traditional teaching methods. Considering these advantages, combined with ChatGPT and VR technologies, the article attempts to construct an adaptive English teaching mode in listening, speaking, reading, and writing from three aspects: teaching technology and approaches, teaching scenarios and content, and teaching assessment and feedback. This mode helps to improve students' learning interest, interpersonal communication skills, and intercultural communication abilities, and optimizes teaching strategies and methods based on intelligent teaching assessment and feedback mechanisms. The study aims to provide a reference for technology integration in the field of English education, with broad application prospects and promotion value.

1. Introduction

Since ChatGPT's release in November 2022, it has quickly become a focal point in education (Jiao, 2023; Lu, 2023). Grounded in deep learning, ChatGPT finds applications in natural language processing, dialogue systems, and text generation. Virtual reality (VR) technology, creating a three-dimensional virtual world, offers users a multisensory experience, enabling real-time observation of three-dimensional space (Sun & Peng, 2020). In the digital teaching era, integrating ChatGPT and VR forms an adaptive English teaching model, creating a realistic learning environment. This model allows students to communicate with virtual characters in diverse English scenarios, enhancing their interest in learning.[1]

Adaptive learning, representing a paradigm shift in online education, leverages advanced computer technologies, using data mining and machine learning to analyze learner behaviors and feedback, optimizing the teaching process (Wu, 2016). This paper aims to construct a concise adaptive English teaching model with ChatGPT and VR, focusing on teaching technologies, methods, scenarios, content, assessment, and feedback for digitalized English teaching and

intelligent course construction in the new era.[2]

2. Teaching Technologies and Approaches

The ongoing evolution of instructional technologies and methodologies constitutes a pivotal discourse within the realm of education. The integration of ChatGPT and virtual reality technology in English pedagogy can be orchestrated through an adaptive instructional paradigm. This approach leverages computer algorithms to fine-tune learner interactions within the virtual reality environment, thus realizing a personalized and adaptive instructional model.[3]

2.1 ChatGPT Technology and English Teaching

"After extensive training on large text datasets, ChatGPT demonstrates the capability to generate sophisticated and intelligent articles (Van Dis et al., 2023). It opens up various possibilities for instructional applications and holds significant potential in the field of education (Kasneci et al., 2023). In the domain of English language teaching, the roles, positions, and relationships of instructional entities, namely teachers and students, may encounter disruption and reconstruction due to intelligent robots (Hu Jia-sheng & Qi Ya-juan, 2023). Foreign language educators need to fully comprehend the strengths and weaknesses of artificial intelligence, adeptly utilizing tools to guide instruction.[4]

The application of ChatGPT in English language teaching encompasses two main aspects: (1) Enrichment of teacher preparation resources and alleviation of teacher workload: ChatGPT serves as a teaching assistant, aiding in lesson planning, monitoring student progress, and addressing student queries. It can tailor personalized teaching plans based on individual student levels, interests, and needs, dynamically adjusting instructional content according to student progress and feedback. (2) Provision of personalized guidance for students and engagement in human-machine intelligent interaction: ChatGPT can generate customized practice exercises based on students' abilities and needs, reinforcing acquired knowledge. Through real-time feedback and suggestions, it assists students in overcoming learning challenges, thereby enhancing learning efficiency. Engaging in dialogue and interaction with students contributes to heightened interest, motivation, and linguistic confidence".[5]

2.2 VR Technology and English Teaching

Virtual reality technology refers to the integration of hardware and software systems to create a simulated environment, enabling users to immerse themselves in a virtual reality and engage in human-computer interaction (Biocca & Delaney, 1995). Immersion, realism, and interactivity are core features of virtual reality (Ryan, 2015). Immersive teaching, originating in Canada, has been widely applied in the field of second language education, representing an instructional approach that integrates principles from education, psychology, and linguistics (Ma, 2021). The application of virtual reality technology in education primarily involves three aspects: (1) Providing teachers with efficient and convenient teaching tools: Teachers utilize virtual reality technology to create virtual laboratories, simulation scenarios, allowing for remote teaching anytime, anywhere; (2) Implementing flexible teaching methods: Through gamified design, students engage in a series of tasks or challenges in virtual reality, enabling them to choose learning content of varying difficulty levels based on their proficiency or needs; (3) Facilitating immersive learning experiences: Students can enter virtual reality to personally experience historical events, explore geographical landscapes, thereby deepening their understanding and memory of the learning content.[6]

2.3 Adaptive Learning and English Teaching

Adaptive learning refers to the dynamic adjustment of learning methods based on the learning information and interaction provided by learners (Somyürek, 2015). Adaptive learning based on ChatGPT and virtual reality technology, as an auxiliary platform, offers teachers a distinctive teaching experience and provides students with specific resources, feedback, and assistance (Walkington, 2013). Adaptive learning stands as a crucial context where artificial intelligence empowers education. Its underlying mechanisms involve two feedback loops: specifying learning tasks and providing feedback (see Figure 1). The inner and outer loops of adaptive learning collectively promote the learning process. The outer loop focuses on overall learning objectives, ensuring students complete progressively complex tasks to master knowledge and skills. The inner loop emphasizes individual learning states, offering personalized feedback at each step.[7]

Adaptive learning serves as the key foundation for the adaptive teaching model. Together, they function collaboratively, complementing each other to form a synergistic teaching approach. This model utilizes advanced hardware technologies such as Oculus Rift, PlayStation Virtual Reality, and software technologies like ChatGPT API and Google Speech-to-Text to achieve highly personalized interactive learning experiences and optimize the allocation of teaching resources (see Figure 2). Compared to traditional English teaching models, the adaptive English teaching model integrating ChatGPT and virtual reality technology enhances students' language proficiency through virtual social scenarios. It provides a richer learning experience, caters to individualized needs, fosters better interactivity, exhibits greater adaptability, and is not constrained by time or location (see Table 1).

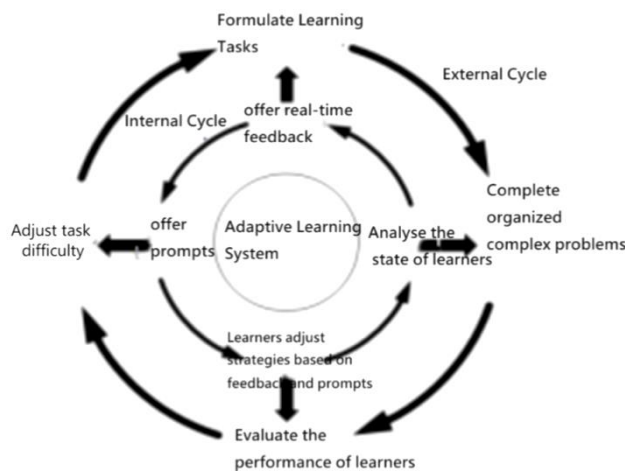


Figure 1: Adaptive Learning System

Technical Support for ChatGPT-VR Digital English Teaching Model	
Hardware Technology	Software Technology
Oculus Rift, HTC Vive, PlayStation VR	ChatGPT API
Oculus Touch, HTC Vive Controllers	Unity, Unreal Engine
Lighthouse, Constellation	Google Speech-to-Text
Audio-Technica, Blue Microphones	Blender, Maya, 3ds Max
Companion 2 Series III, SoundLink Revolve+	Python, R, Tableau
Republic of Gamers, TUF Gaming	

Figure 2: "Technical Support for the ChatGPT-VR Adaptive English Teaching Model

Table 1: Comparative Analysis of Two Instructional Models

Characteristics	ChatGPT-VR Adaptive English Teaching Model	Traditional Teaching Model
Learning Experience	Enhance language application in virtual social settings.	Applying knowledge in diverse contexts is challenging.
Personalization	Provides personalized learning tasks through ChatGPT and VR	Challenges in meeting individualized student needs
Social Elements	Integrates language learning with social elements	Relatively weak in social elements
Learning Efficiency	Offers targeted guidance, leading to higher learning efficiency	Lower learning efficiency
Adaptability	Better adaptation to various social situations	Challenges in adapting to different social situations
Interactivity	Strong interactivity with ChatGPT	Teacher-centric, limited student interaction
Accessibility	Not constrained by time and location	Subject to time and location limitations

3. ChatGPT-VR Adaptive English Teaching Scenarios and Content

In the era of ChatGPT technology, it is imperative not only to embrace intelligent language learning environments and conditions but also to actively seek changes in foreign language teaching content (Hu Jia-sheng & Qi Ya-juan, 2023). As an intelligent language model, ChatGPT can facilitate human-machine dialogue within virtual reality technology, enhancing the interactivity, intelligence, and flexibility of instructional scenarios. Teachers can dynamically adjust teaching content and difficulty based on students' learning abilities and progress. The following section will illustrate, through examples of English teaching, how this model can be applied in specific instructional settings.[8]

3.1 English Listening Teaching Scenarios and Content

3.1.1 English Listening Teaching Scenarios

①Interactive Virtual Listening Classroom: In this classroom setting, ChatGPT primarily serves as a teaching assistant, offering students real-time feedback and interactive information.②Intelligent Virtual Listening Assessment: Following the virtual listening class, students participate in an intelligent listening assessment provided by ChatGPT, which intelligently evaluates their proficiency. Teachers and ChatGPT analyze the results of the assessment to identify students' weaknesses and develop optimized learning strategies.③Personalized Virtual Listening Tutoring: Based on students' results from the virtual listening assessment, teachers and ChatGPT provide personalized listening guidance. For instance, ChatGPT may create new listening exercises and continue with training to address specific areas of improvement.[9]

3.1.2 English Listening Teaching Content

①Business Scenario Listening Training: Utilizing ChatGPT, this training involves providing relevant business listening materials and questions, such as business meetings, negotiations, and

business lectures.②News Scenario Listening Training: In this training module, ChatGPT offers pertinent news listening materials and questions, covering topics like political news, economic news, and social news.③Leisure Scenario Listening Training: ChatGPT facilitates training in leisure-oriented listening by providing relevant materials and questions related to activities such as movies, music, and English and American dramas. Students engage in situational listening training across different virtual scenarios, leveraging ChatGPT technology for intelligent feedback and guidance.[10]

3.2 English Speaking Teaching Scenarios and Content

3.2.1 English Speaking Teaching Scenarios

①Virtual Oral Communication Classroom: Through virtual reality headset immersion into a simulated language laboratory, students engage in interactive spoken communication with ChatGPT. ChatGPT can simulate various roles, such as students, teachers, and business professionals, allowing students to engage in dialogues in different scenarios based on selected topics. During the conversations, ChatGPT instructs essential oral communication content and corrects pronunciation and grammar errors.②Virtual Intercultural Communication: Using virtual reality headsets to enter various virtual countries, students experience everyday communication in different cultural contexts. ChatGPT plays the role of a cultural guide, guiding students to interact with virtual characters, understand cultural customs of different countries, and enhance their intercultural communication skills. Simultaneously, ChatGPT provides targeted oral communication guidance, assisting them in handling more complex language contexts.③Virtual International Collaboration: Through virtual reality headsets entering simulated work scenarios, students participate in multinational collaborative projects. Students need to communicate and collaborate with virtual team members from diverse cultural backgrounds. ChatGPT acts as a team coordinator, offering communication advice to students, helping them solve teamwork challenges, and enhancing their international collaboration capabilities.[11]

3.2.2 English Speaking Teaching Content

①Social Spoken Language Training: ChatGPT provides students with relevant spoken English materials for social situations, such as gatherings, dating, and making friends.②Travel Spoken Language Training: ChatGPT offers students relevant spoken English materials for travel scenarios, including hotel reservations, airport ticket collection, car rentals, ordering meals, and more.③Academic Spoken Language Training: ChatGPT supplies students with pertinent academic English spoken language materials, such as academic presentations and conferences. Students can experience virtual social, travel, and academic scenarios, engage in communication with virtual entities, and enhance their skills based on feedback from ChatGPT.[12]

3.3 English Reading Teaching Scenarios and Content

3.3.1 English Reading Teaching Scenarios

①Virtual Character Simulation: ChatGPT can engage in role-playing based on literary works students have read, facilitating a better understanding of character traits and storylines.②Virtual Book Club Discussions: ChatGPT can organize virtual book club discussion activities, inviting students to share their reading experiences in a virtual environment and encouraging in-depth

reflection.③Virtual Reading Challenge: In a virtual competition setting, ChatGPT can provide students with reading materials and questions, setting up levels with different themes and difficulties. Upon completing levels and answering questions, students earn point rewards, contributing to the stimulation of their interest in learning and competitive awareness.

3.3.2 English Reading Teaching Content

① News Periodical Reading Training: ChatGPT recommends English newspaper materials such as Global Times and China Daily to enhance reading proficiency. It provides a virtual news environment for better comprehension of news context and background.②Literary Works Reading Training: Utilizing ChatGPT to recommend English and American literary works, including short stories and poetry, has proven to be an effective method in enhancing students' engagement with literature. By employing virtual reality technology to simulate situations and scenes from these literary works, educators can create immersive experiences, allowing students to fully immerse themselves in the narrative. Activities such as role-playing and interactive Q&A can be incorporated to enhance student engagement.③Popular Science Knowledge Reading Training: ChatGPT recommends English popular science articles covering various fields, including natural sciences. Educators are using virtual reality technology to create an immersive popular science reading experience, enhancing students' engagement with complex scientific concepts and making the learning process more interactive and enjoyable. For instance, when reading articles about space exploration, students can virtually experience the cosmic sky, facilitating a better understanding of the article content.

3.4 English Writing Teaching Scenarios and Content

3.4.1 English Writing Teaching Scenarios

①Virtual Writing Collaboration Platform: Students can collaborate online with peers or virtual characters to collectively complete various writing tasks such as reports, reviews, and stories. Supporting multi-user collaboration, this platform aids in fostering teamwork skills and provides students with a more comprehensive writing practice experience.②Virtual Writing Genre Laboratory: Students can explore the characteristics and techniques of various writing genres, such as narrative, expository, argumentative, and prose, through interactive tutorials and example texts. This laboratory also facilitates virtual creative writing, allowing students to engage in practical writing within virtual contexts.③Virtual Writing Technique Laboratory: This laboratory offers learning and practice materials on rhetorical and writing techniques. Through virtual creative activities, students can apply relevant writing techniques in different writing scenarios to enhance their writing skills. In these scenarios, ChatGPT can provide real-time feedback and guidance, assisting students in continual improvement of their writing abilities.

3.4.2 English Writing Teaching Content

①Virtual Writing Collaboration Platform: Students can collaborate online with peers or virtual characters to collectively complete various writing tasks such as reports, reviews, and stories. Supporting multi-user collaboration, this platform aids in fostering teamwork skills and provides students with a more comprehensive writing practice experience.②Virtual Writing Genre Laboratory: Students can explore the characteristics and techniques of various writing genres, such as narrative, expository, argumentative, and prose, through interactive tutorials and example texts. This laboratory also facilitates virtual creative writing, allowing students to engage in practical

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4. ChatGPT-VR Adaptive English Teaching assessment and Feedback

Adaptive English teaching assessment based on ChatGPT-VR primarily encompasses the following four aspects: teacher assessment, ChatGPT assessment, student self-assessment, and peer assessment (See Table 2).

Table 2: ChatGPT-VR Adaptive English Teaching assessment and Feedback

Assessment Entity	Assessment Metrics	Virtual Scene-based Metric Description	
Teacher assessment	Interactive Participation	Frequency of interaction with ChatGPT, accuracy of responses.	
	Situation Adaptability Ability	Adaptability to unexpected situations.	
ChatGPT assessment	Listening	Language Similarity and Contrast Construction	The ability to recognize and differentiate synonyms and near-synonyms.
		Ambiguous Information Processing	The capability to process incomplete or ambiguous auditory information.
	Speaking	Pragmatic Competence	The proficiency in appropriately using language in specific contexts.:
		Cross-Cultural Thinking	The capacity to convey information to audiences from different cultural backgrounds.
	Reading	Implicit Information Extraction	The ability to comprehend implicit information and the main idea within a text.
		Critical Thinking	The ability to critically judge the validity of information.
		Comparative Analysis Skills	The capability to identify intrinsic connections and differences within a text.
	Writing	Audience Adaptability	The ability to adjust writing style in different topics or situations.
Application of Rhetorical Strategies:		Proficiency in applying various rhetorical techniques to enhance expressive effectiveness.	
Self-assessment	Learning Autonomy	Ability to self-improve based on real-time feedback	
	Time Management	Ability to plan study time reasonably	
Peer assessment	Subject Knowledge Application	Ability to apply knowledge in practice.	
	Team Collaboration	Ability to collaborate with other students or virtual characters	

Teacher assessment is characterized by its professionalism and specificity, but is sometimes inevitably influenced by individual subjective factors. In comparison, ChatGPT assessment can offer more objective and comprehensive assessment results. Student self-assessment promotes students' self-reflection and growth, while peer assessment contributes to enhancing students'

critical thinking and judgment abilities. Each of these four assessment methods has its own advantages and disadvantages, and a comprehensive approach should be adopted to achieve more objective and effective teaching assessment. Through these assessments and feedback, teachers can gain further insights into the application and performance of the ChatGPT-VR adaptive English teaching model in practical teaching.

5. Conclusion

In conclusion, this paper has established an adaptive English teaching model that integrates ChatGPT and virtual reality technology, covering the aspects of teaching technology and methods, teaching scenarios and content, as well as teaching assessment and feedback. This adaptive teaching model contributes to enhancing students' interest, motivation, cross-cultural communication skills, and learning efficiency. Moreover, it optimizes teaching strategies and methods based on intelligent teaching assessment and feedback mechanisms, aiming to provide reference for the integration of technology in the field of English education. Future research could further expand in the following areas: ① Conduct empirical studies to evaluate the effectiveness of the adaptive English teaching model integrating ChatGPT and virtual reality technology in practical applications; ② Explore the applicability of ChatGPT and virtual reality technology in different educational stages and disciplines to meet broader educational needs; ③ Continuously optimize the adaptive English teaching model to improve teaching quality and effectiveness; (4) Integrate other educational technologies such as AI educational assistants and big data analytics to enhance the intelligence of adaptive learning systems.

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