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The Application of Virtual Reality Technology in English Education and Its Impact on Learning Outcomes

Derong Tang

Chongqing Metropolitan College of Science and Technology, Teaching quality and monitoring and Evaluation Center, Yongchuan, Chongqing, 402167, China

ABSTRACT

With the rapid development of information technology, the traditional English teaching model is facing an insurmountable practical dilemma. Because language acquisition needs the support of real environment context, in traditional English classroom teaching, the ordinary classroom has defects in the construction of situation, the integration of culture, and the provision of psychological security. With the help of virtual reality (VR) technology, the above difficulties can be effectively overcome. Because of its advantages of immersion, interactivity, and situational simulation, it can strengthen language acquisition training and deepen cross-cultural understanding. Therefore, this paper makes an in-depth study of the diversified application modes of VR technology in English teaching and studies the cognitive, psychological, and behavioral influence mechanism of VR technology in language teaching. This paper provides some theoretical references for technology-empower language teaching.

KEYWORDS

Virtual reality; English education; Language acquisition; Learning effect

1 The theoretical basis of a pedagogy of virtual reality technology

1.1 Situational cognition

The view that linguistic competence can not be formed without real social practice and cultural background is the core of situated cognition theory. According to this theory, knowledge is not a static abstract concept but a product of individuals' gradual construction through interaction in a specific situation. In the traditional English classroom, language rules are separated from real-life situations. Although learners master the grammatical framework, using it flexibly in real communication is difficult. Virtual reality technology bridges this gap by constructing interactive three-dimensional scenarios. In the VR environment, when learners participate in simulated shopping conversations, travel directions, and other tasks, vocabulary and grammatical structures no longer exist as isolated elements but are transformed into problem-solving tools. When the learner is in a virtual coffee shop ordering, "May I have a Latte?" completes the goal with gestures, scene cues, and real-time feedback.

1.2 The input hypothesis and immersive environments

According to the input hypothesis, the key to language acquisition is to receive sufficient quantity and quality of "Comprehensible input." An ideal language learning environment should provide learners with continuous, substantial, and above-current-level language input. Due to various limitations, creating such learning conditions in traditional classrooms is difficult. Virtual reality technology provides a new possibility to achieve ideal input conditions by constructing an immersive language environment. In VR, learners are surrounded by a full range of target language environments, receiving natural input from different scenarios and speakers[2]. This form of input breaks through the limitations of time and space in traditional classrooms, enabling learners to obtain language exposure experiences similar to those in the target language country in a virtual environment.

2 Dimensions of VR technology application in English education

2.1 Innovative models of language skills training

2.1.1 VR scenarios for improving oral expression

Due to the lack of real conversation situations and immediate feedback, traditional oral English practice tends to be a mere formality, and learners are faced with both psychological anxiety and rigid expression. Virtual reality technology has

completely changed this situation by reproducing life-like scenes. When students wearing VR devices enter a simulated hotel reception desk to check in, the virtual reality technology will create a virtual reality environment, and the virtual receptionist asks, "How many nights will you stay?" The visual elements of the environment, such as the clock, the price list, and the room card, naturally serve as secondary anchors for linguistic meaning and drive learners to organize complete responses. The speech recognition system analyzes the accuracy and fluency of the expression simultaneously. The system can prompt restatement or demonstrate standard sentence patterns if there are grammatical errors or vague expressions. This kind of immersive interaction with moderate pressure circumvents the awkwardness of real-life dialogue. It reinforces the need for language output——you cannot advance the plot without opening your mouth[3]. With repeated training, learners gradually overcome the psychological barrier of "Not daring to say" and form situational pragmatic strategies in various tasks such as ordering food and asking directions, significantly improving the automatic language response level.

2.1.2 Three-dimensional context for enhancing vocabulary memory

Word memorization out of a language environment has been proven to have a high forgetting rate problem, while VR technology transforms abstract words into tangible embodied experiences. For example, when learning the word "drizzle, " the learner is placed on a virtual London street with a vision of a fine drizzle blowing in the wind, a skin sensor that transmits the sensation of moisture, and an auditory sensation that accompanies the patter of rain on an umbrella. Multisensory collaborative input allows words to move beyond textual definitions and establish neural connections with physical perception. More valuable is the interaction design——to activate the"umbrella" function key to block the rain, one must first understand the voice command "The drizzle is getting heavier." This "Perception-cognition-action" loop allows vocabulary to be naturally internalized in problem-solving, and its memory strength is far greater than that of traditional flashcard training. Experiments show that the deep association between spatial memory encoding and action participation can significantly prolong the retention period of words.

2.2 Cultivation of intercultural communicative competence

2.2.1 Virtual target language immersion

Cross-cultural understanding is the deep goal of English education. VR technology goes beyond the limitations of text description and video playback so that learners "Become" cultural participants[4]. When students enter the Thanksgiving Day family gathering scene through the virtual avatar, they need to choose their clothes, observe table manners, and participate in the turkey-cutting ceremony to operate the virtual knife and fork. The system sets up a cultural conflict event. If the learner ignores the hostess's euphemistic refusal of "I am quite full, but thank you" when she insists on passing the plate, it will trigger the virtual characters' confused expressions and subsequent conversation barriers. The immediate feedback mechanism of the consequences of cultural behavior enables learners to understand the communicative rules behind language deeply—the difference between acceptance and rejection in different language environments is not only a matter of language form but also a reflection of cultural value. Repeated cultural situation drills effectively eliminate stereotypes and cultivate cultural adaptability.

2.2.2 Simulation of nonverbal communication behaviors

Verbal communication accounts for only 30% of the total information in interpersonal communication, while VR provides special training for non-verbal behaviors that traditional teaching has long ignored. In the simulated business negotiation scenario, the learners had to deal with verbal and non-verbal signals: the slight reclining posture of the virtual negotiation partner suggested resistance and crossed arms might indicate defensiveness. The system uses motion-capture technology to analyze students' behavior in real-time——If one frequently looks at their watch while the other party is speaking, the progress of the negotiation will quickly drop into the red warning zone. Otherwise, when the system detects the learner nodding his head and maintaining appropriate eye contact, the virtual character tone significantly eases and promotes agreement. This kind of embodied practical training strengthens students' sensitivity to cultural differences: A firm handshake symbolizes trust in Western culture. In East Asian scenes, cultural adaptability needs to be adjusted regarding strength and duration.

3 The influence of virtual reality technology on learning effect

3.1 The influence mechanism at the cognitive level

The virtual reality environment reconstructs learners' cognitive processing pathways by integrating multi-modal information. Traditional language input mainly relies on a single modality, such as auditory sensation and text, and knowledge is stored in fragmentation, resulting in low extraction efficiency. The VR technology combines three-dimensional vision space, environmental sound effects, and tactile sense feedback. In the simulation of supermarket shopping, the color and weight of oranges are simultaneously stimulated by the salesperson's voice, "These oranges are freshly picked," which activates multiple sensory areas of the brain. This holographic input mode forces learners to integrate vocabulary, grammar, and situational cues into a unified meaning unit and form a stronger neural association network in the memory encoding stage. More critical is the application of spatial cognition——when learners are asked to look for the dean's office on a virtual campus according to a sign "Turn left at the library," verbal commands form a conditioned response to a real spatial Turn. Repeated training promotes the direct correlation between language symbols and spatial orientation perception, gradually replaces the intermediary link of mother tongue translation, and fundamentally shortens the language reaction time[5]. This embodied cognitive mechanism not only speeds up the automatic processing of language but also changes metacognition strategies: Learners begin to actively analyze the spatial deixis and cultural cues in the scene, improving the systematic efficiency of information decoding. Language knowledge is transformed from "Storable memory" into "Instrumental intelligence," which is more creative and adaptive when driving output.

3.2 Characteristics of psychological influence

The simulated human-computer interaction environment creates a unique psychological buffer period, effectively repairing emotional barriers in foreign language learning. "Performance anxiety," a common phenomenon in classroom oral practice, stems from learners' fear of negative evaluation from others. Although virtual objects have the characteristics of human appearance, they have no real social pressure; when the virtual character in the international student orientation scene asks, "Which cultural festival do you like best?" The student dares to try a difficult expression in the face of a program-generated receptive expression (such as continuing to smile or leaning forward); even grammatical errors do not trigger shame. This low-risk trial-and-error space gradually dissolves the psychological defense mechanism and increases the frequency of oral output. The sensory isolation created by VR devices enhances the "Flow experience": when learners use virtual avatars to participate in archaeological excavation seminars, 360° surround projection screens isolate external distractions, and the task is purposeful (identifying the age of the artefact), immediate feedback mechanisms (role response plausibility scores) create a positive motivational cycle. Deep immersion evokes inner exploration, which leads to a high concentration of attentional resources——learners often ignore the passage of time at the end of a discussion. This pleasant psychological state not only enhances learning stickiness but also the accumulated positive emotional memory will be transferred to the real language scene, forming an anti-anxiety mental toughness, and the qualitative leap from "Task output" to "Expressive output" is realized.

3.3 Behavioral-level affect performance

The strong interactivity of virtual practice leads to the behavioral transfer effect of generalization of language ability to real scenes. In traditional teaching, role-playing activities have the disadvantage of simplifying behavior, such as ordering food only focusing on sentence pattern recitation and ignoring emergency response. Dynamic scenes in VR systems promote adaptive behavior. In simulated customs clearance, if the learner can not explain the antique artifacts in the luggage after answering "Purpose of your visit," Virtual officers will step up security and ask for details. This pressure situation forces learners to use paralinguistic strategies: slow down the speech to facilitate thinking, adjust gestures to emphasize sincerity, and supplement cultural background knowledge ("It is a replica of Han Dynasty pottery"). More significant changes occur in the cross-cultural context. After the London Underground ticketing practice, learners' finger operation path and eye focus position when facing a real ticket vending machine were highly consistent with the VR training. When attending international conferences, non-verbal behaviors (such as maintaining a dialogue distance of 1.2 meters in Western contexts and appropriately inserting brief feedback phrases like"Exactly") exhibit characteristics of subconscious reproduction. These embodied responses verify the depth of the simulation training on muscle memory and behavioral paradigms.

4 Conclusions

Virtual reality technology deeply reconstructs English education's knowledge construction mode and ability transformation path. It creates an integrated reform of three dimensions of cognition, psychology, and action for language learning. At the level of cognitive mechanism, its multi-channel situation design beyond the traditional teaching transforms fragmented knowledge into callable communication strategies, and realizes the transition from symbolic memory to spatial thinking; at the level of psychological effect, the low-risk simulation environment dissolves emotional barriers, promotes high-concentration flow experience, and enables learners to complete the subjective remodeling from passive acceptance to active expression; At the level of behavioral practice, immersive participation in cultural rituals and micro-training of non-verbal behaviors facilitate a seamless connection between language output and real-life scenarios. This kind of technology transcends the physical limitations of the traditional classroom and substantially shortens the cycle of language ability development. Future research needs to explore further the deep coupling between technology application and cultural acquisition so virtual practice can truly become a bridge to eliminate language barriers and cultivate global citizenship.

About the Author

Derong Tang, master in Reading, lecturer, research direction: English.

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