



Design and Implementation of English Listening Teaching System Based on Virtual Environment Technology

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Abstract. English listening teaching is an important part of English teaching. English listening should be the first skill for English learners to master. But for Chinese students, English listening has become the most difficult barrier on their way to English learning. The design and implementation of English listening teaching system based on virtual environment technology is a unique product to help students improve their listening skills. It provides them with the best learning experience. The main purpose of this product is to improve students' listening skills. Students will be able to use this device for at least 30 min a day for 3 months or more to learn from it. The equipment can help students improve their pronunciation, fluency and understanding through the effective use of pictures, videos, animation and other audio-visual tools.

Keywords: English listening · Virtual environment technology · Teaching system

1 Introduction

The focus of English teaching is to cultivate students' ability to communicate in English, in other words, it refers to their ability to listen, speak, read and write in English. The teaching purpose of junior high school English listening is to enable students to fully understand the structure and meaning of language, enrich their cultural knowledge, and focus on the application of students' listening strategies. Students can develop their abilities in analysis, inference and other aspects in the learning process, and can also cultivate students to master the rules of listening through specific listening practice, which is beneficial to students' conscious and efficient learning, so as to achieve the goal of improving their listening level [1]. English listening teaching has its own advantages, mainly in the following aspects:

- (1) English listening teaching activities can be highly exemplary and flexible. However, the traditional English teaching mode focuses on the cultivation of reading and writing ability, while neglecting the cultivation of audio-visual and speaking ability,

which leads to the sequela of the current “inability to speak”. English listening is one of the important links in English teaching, so we should have a correct attitude towards the development of listening teaching in junior high school English teaching, master the basic methods of English listening, and overcome many difficulties encountered in the process of listening training. How to improve students’ listening ability leaves a problem for teachers engaged in basic English education [2].

- (2) English listening teaching activities are very practical. The focus of English listening teaching is to exercise and improve students’ ability and skills to use “listening”. The understanding and mastery of these abilities and skills are mainly realized by students through a large number of “listening” training in the classroom and outside the classroom, rather than simple explanations by teachers, so listening teaching is very practical.

In English learning, the most important thing is to develop students’ English listening ability, and English listening is the most difficult link to learn and master in English subjects. Therefore, in the process of learning, students will have psychological burden on English learning due to obstacles in English listening learning. In the long run, students will resist English learning and lower their English teaching level [3]. English listening learning in the virtual immersion environment is to help students carry out listening training in a specific environment with the help of external factors, so as to achieve the goal of improving students’ English listening ability.

“As a new and powerful educational technology, VR has brought new opportunities to improve the comprehensive application ability of college students’ English listening. Many empirical studies have verified the effectiveness of VR English listening teaching.”

So far, the developed VR English listening learning platform can simulate real scenes, which to some extent alleviates the lack of a real and natural English listening communication environment. However, the lack of targeted and practical teaching resources has not significantly improved college students’ English listening application skills; The interactive and immersive experience of three-dimensional virtual scene teaching is poor.

This article combines English listening learning theory with VR teaching mode, and applies UE4 virtual engine technology innovation to the development and design of VR English listening learning platform. It deeply studies the design of teaching resources based on college students’ learning needs and ability status quo, exploring the characteristic functions of three-dimensional virtual corner avatar and voice interaction, and enhancing the sense of learning immersion. Improve the realism of VR English listening situational teaching experience as a whole, enable college students to naturally acquire English listening in a virtual learning environment, and smoothly enhance their comprehensive English listening application ability.

2 Related Work

2.1 Concept of Virtual Environment

Virtual Environment (VE) is a new and high technology developed at the end of the 20th century. With the help of it, the real world can be simulated into the computer network, so that users who enter it can feel as if they are in the scene, immersed in it

without doubting its authenticity. In recent years, VE technology has been widely used in architecture, medicine, military, entertainment, education and other fields, and has penetrated into foreign language teaching [4]. The concept of a virtual environment is shown in Fig. 1 below.

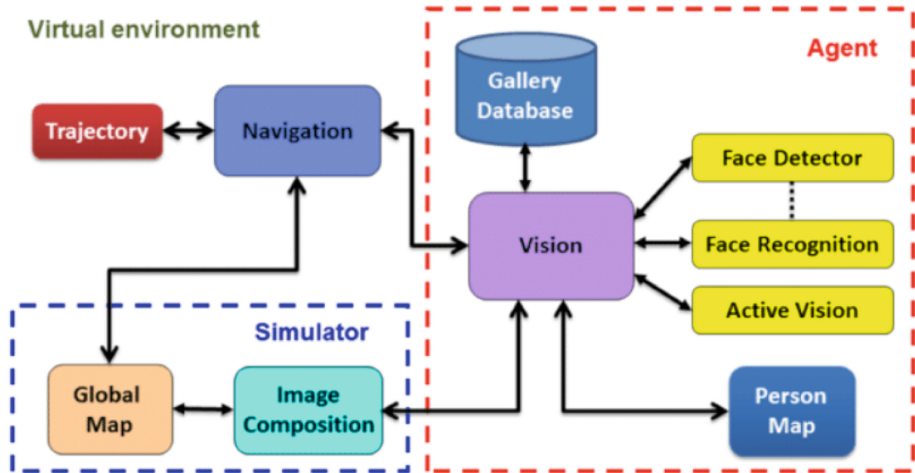


Fig. 1. Concept of Virtual Environment

At the beginning of this century, experts from all countries began to study the application significance and prospect of VE technology in foreign language teaching, and designed some language learning systems based on VE technology, such as “VirLan” (virtual reality language learning network) in Britain. European experts designed the virtual reality language Learning Network (VirL, an) based on 3DMAX software, which was funded by the European Union. VirLan creates a virtual reality foreign language environment for foreign language learners to provide them with real-time collaboration and communication. It aims to enable learners to use their foreign language skills from the initial stage of language mastery, stimulate their motivation to learn a foreign language, and more importantly, it can enable learners to actively cooperate in the learning process to solve cognitive and communicative tasks. The research shows that it is possible to use VE technology to simulate the target language environment into the computer network for foreign language learners far away from the target language countries to immerse them in a language environment that is similar to the real language environment. This ideal foreign language learning environment has created favorable conditions for “student-centered”, which is conducive to the development of autonomous foreign language learning [5]. Therefore, it has important practical significance for the current foreign language curriculum and teaching reform in China.

Virtual environment is an artificially created and controlled environment, which can organically combine classroom learning and extracurricular learning to form an

“exploratory + discovery” learning system simulating world phenomena and environments. Virtual environment, based on the dynamic simulation of foreign language learning social environment, emphasizes learners’ participation, interaction and knowledge co construction, and has become a new way of language learning. Virtual environment provides students with the space to observe phenomena, imitate context and experiment communication. Its characteristics of “immersive and entertaining” can cultivate students’ ability to actively think and solve problems and phenomena, thus stimulating learners to become explorers, developers and builders of knowledge. Therefore, the virtual environment makes full use of the characteristics of modern technologies such as the Internet and multimedia to truly realize situational, personalized and interactive foreign language learning, which can not only help teachers improve teaching efficiency, but also help students improve their ability to solve problems and explore knowledge. The VR virtual environment technology is shown in Fig. 2 below.



Fig. 2. VR Virtual Environment Technology

2.2 Problems in English Listening Teaching

In the contemporary society, English communication ability is becoming increasingly important. The author investigated some teachers and found that listening comprehension is a weak link for a large number of students. Teachers’ teaching is basically exam centered. English teaching has always attached importance to written tests and ignored the actual communication ability, which makes a large number of students learn “dumb English”, with non-standard pronunciation and difficulty in speaking. In the classroom teaching process of English listening, teachers usually put tapes, students listen while doing questions, and teachers then make corrections according to the answers [6]. As a result, students’ enthusiasm for learning English has been exhausted. To some extent, students have a certain foundation of English, but it is an indisputable fact that the level of English listening comprehension is low. For students, they can basically understand the classroom English of their familiar teachers, and they can also understand the teaching materials in English listening class. However, if they encounter materials in the real language environment or listen to the dialogue between native English speakers, most students will find it difficult to adapt and understand. Especially when communicating with foreigners in English, there are usually some obstacles in understanding and culture. Based on the survey and interview with the teachers, the author summarized the following two problems in the teaching of English listening in junior middle schools:

On the one hand, there is a lack of communication and interaction in the teaching process. In the current English listening teaching in China, listening classes mainly focus on the test of listening ability, ignoring the training of listening skills, so the ultimate goal of improving students' listening ability has not been achieved; The teaching content of listening class is single and boring, lacking vivid and specific content [7]. Many teachers are more accustomed to follow the syllabus step by step and limit the classroom content to the textbook. For a long time, many students have lost interest in English listening. Inattention or even drowsiness on the upper level will inevitably lead to little improvement in hearing level; Traditional teaching takes teachers as the main body, which cannot mobilize students' initiative. There are few classroom interaction activities, and students are in a state of being informed by teachers. Teachers and students cannot interact well with each other, so that the teaching effect is ordinary, and it is difficult to achieve the expected teaching effect.

On the other hand, the authentic English language environment cannot be contacted in the teaching process. The language materials of English listening mainly come from textbooks, and the main learning place is classroom. It can be said that students cannot touch the daily life of native English speakers, that is, they cannot hear the non-standard spoken language in their life. In the process of teaching, teachers are teaching standard English in textbooks, without paying attention to cultivating students' ability to use English in different environments. Some teachers in the classroom teaching process, in order to enable students to understand or keep up with the teacher's progress, many teachers try to slow down their speaking speed, try to read each English word or each pronunciation syllable slowly and clearly, which leads to the loss of the normal intonation and rhythm of speech. In daily life, there are more "spoken" English, which is very difficult for students who only learn standardized English. In daily life, there are many such "colloquial" situations when communicating with each other [8]. We will also encounter various language phenomena that are not standardized for us, such as language variation. The same word will have many different pronunciations, intonation and rhythm, so there will be obstacles and difficulties in understanding for students who can only contact book standard English. The cultural differences between the East and the West, and the lack of a good language environment, have weakened students' interest in speaking English.

3 The Difference Between Virtual Environment Teaching Mode and Traditional Teaching Mode

Immersive teaching method is an innovative teaching model that uses non native speakers of the second language as a force to the teaching language. This theoretical basis is derived from Ding's language acquisition theory in the 1960s, which states that target language abilities can only be acquired through natural acquisition processes. This natural acquisition ability helps language learners acquire receptive and productive skills, while immersion teaching methods can provide the environmental conditions for such unintentional acquisition in foreign language teaching.

The VR English learning platform provides users with a highly immersive and naturally interactive language teaching environment, and sets English as the only communication language based on the immersive teaching method. Among them, some learners

with poor English proficiency may not be able to adapt to a fully immersive English teaching environment, and the importance of animation interaction is evident. For more difficult learning content, VR platform teaching courseware may include interactive interpretation of animation or a small amount of English interpretation combined with video courses. For example, the field learning activities provided by the learning platform may have many field specific terms, and the full English situational teaching mode is dominant, Supplemented with a small amount of English explanations or interesting animated presentations, it avoids the psychological phenomenon of students' irritability and resistance due to inability to understand, ensures that students are not separated from the English language environment, and fully mobilizes the enthusiasm and initiative of learners.

The experiential learning theory understands learning as the process of creating knowledge through the transformation of experience, and the result of knowledge is the combination of grasping and transforming experience. The immersion and interactivity of virtual reality are closely aligned with the core characteristics of the theory, such as the principle of interactivity, the principle of continuity, and the group learning model. The key to applying experiential learning theory to VR English learning mode is to enable learners to experience the use of English as a language in a pure English learning environment, communicate in English in a virtual environment, conduct various learning activities in English, experience the joy of English in situational interactions, and ultimately internalize English into their own knowledge, thereby flexibly applying it to other environments.

Traditional English teaching is at the expense of students' mother tongue, while three-dimensional virtual immersion teaching coexists with their mother tongue. In other words, three-dimensional virtual immersion teaching realizes the teaching mode of combining isolated simple teaching with other multi-element disciplines, thus providing a new language natural environment for students to learn English listening. The system composition is shown in Fig. 3 below.

In addition, under the traditional mode, the scope of students' learning English listening is relatively narrow. When learning English, they usually join the language interference of their mother tongue, which makes students unable to really participate in English learning peacefully [9]. The three-dimensional virtual immersion teaching is used to fix students in a specific environment. Any communication and life in this environment use the target language, so that students are completely in the English learning environment, which is very effective for students to improve their English listening ability, as shown in Fig. 4. For example, according to the 2013 survey of schools nationwide that use the three-dimensional virtual immersion method to teach English listening, most students have improved their English listening ability to varying degrees in the three-dimensional virtual immersion teaching. In addition, students have not only strengthened their English listening ability, but also greatly improved their English language skills through the combination of immersion teaching and life learning. At the same time, through immersion learning, students' creativity and intellectual level have been maximized.

In addition, under the traditional English listening teaching mode, students' language listening practice basically comes from the classroom, and students' intensive English

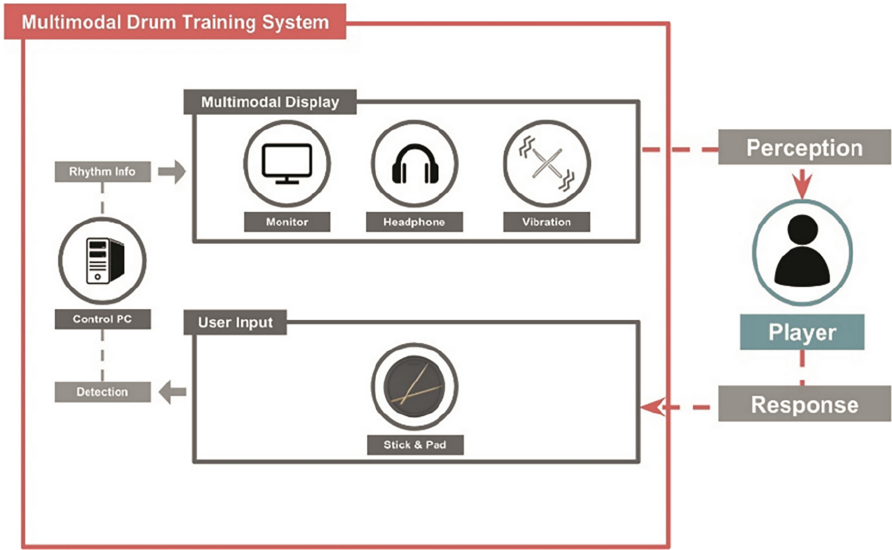


Fig. 3. System composition

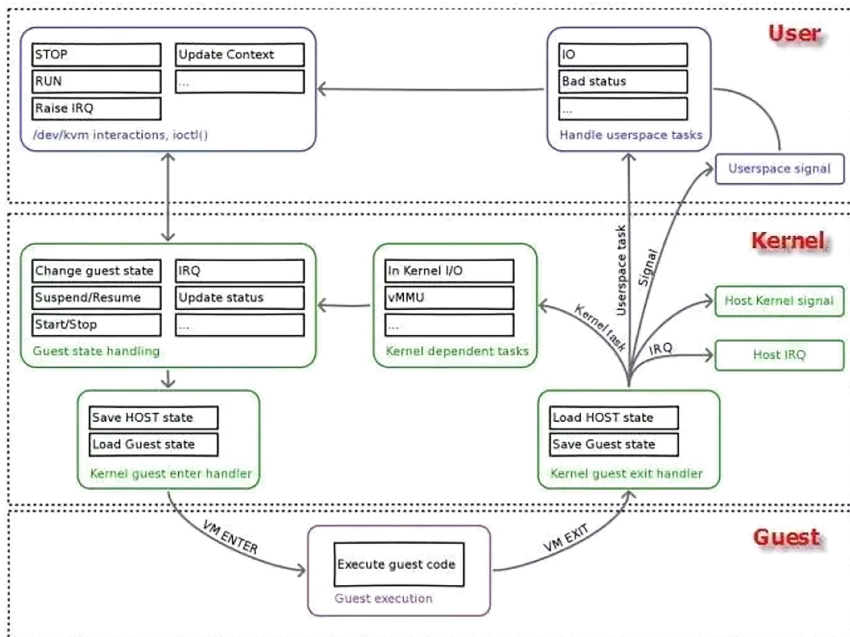


Fig. 4. The teaching model of English listening in virtual environment

listening learning can only be mechanically repeated. In this teaching mode, it is easy to make students feel tired of English listening, thus reducing their ability to learn English

listening. And the English listening learning under the virtual immersion environment can create a closed language learning environment for students, so that students can enhance their subjective awareness of learning English listening in this environment, and then improve their English listening level. Therefore, in terms of the comparison between the two, the relevant national departments conducted a virtual immersion teaching experiment on the fifth grade students of a school [10]. After a period of time, most of the students in the whole grade can quickly understand English passages and write fluently. At the same time, the results of language tests conducted on grade students show that students can only understand the simplest English listening content when they do not accept virtual immersion learning. After a period of virtual immersion teaching, students can basically complete more complex English listening tests, and the accuracy rate is as high as 95%. The configuration of the enhanced virtual environment English teaching system is shown in Fig. 5 below.

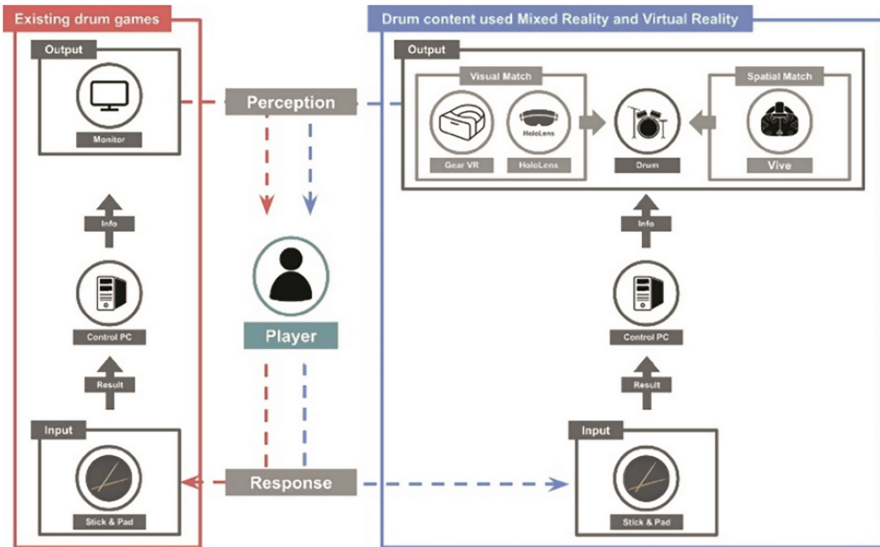


Fig. 5. Strengthen the configuration of English teaching system in virtual environment

4 Design of English Listening Teaching System Based on Virtual Environment Technology

The design of teaching resources for the platform is based on the current situation of college students' English learning needs and abilities. The selection of any course resources for the platform is based on the learning needs of students. The most demanding English skills for college students are listening and speaking; They desire practical and contemporary learning content; Adopt a highly experiential situational teaching method. In addition, college students are the most dissatisfied with the teaching content and environment, and desire a real English communication environment.

In view of this, the improvement of listening and speaking skills has become the focus and core of teaching resource design for the VR English learning platform, with situational dialogue as a major focus of teaching activities. When learning an English knowledge point, users can enjoy multimodal teaching resources such as sounds, 3D images, 3D animations, and videos. Coupled with cartoon style teaching scenes, they can greatly help create humorous and funny situational teaching dialogues and enhance the sense of immersion in learning. In order to ensure the interest and relevance of learning content, and make full use of context and situational communication, the platform advocates using role avatars to carry out comprehensive English application situational teaching based on learning tasks. The activity content is close to real life and emphasizes practicality. For example, campus learning scenes (using VR virtual characters and scenes to provide more realistic presentation and practical training, the main purpose of which is to train students' presentation skills and cultivate self-confidence); Job search scenarios (to cultivate learners' practical application abilities such as writing resumes in full English in a real context to find a job or interview). Moreover, the curriculum design module should pay attention to the time limit, emphasizing the fragmentation of learning content, that is, each learning content module should be controlled within 15 min (special situation learning content within 30 min), in order to comply with the laws of visual retention and human cognitive characteristics, and follow human cognitive laws. In addition, research has shown that by adding transparent still images (visual cues) to animations and combining dynamic and static visualization into one media, it can compensate for the transitory nature of dynamic visualization, which may bring unnecessary cognitive burden to learners. Therefore, some 3D static images with suggestive effects will be added to teaching resources to assist in teaching, explaining some difficult to understand knowledge points that arise during the learning process.

The arrangement of teaching course content combines listening and speaking, reading and writing. For junior high school students, the combination of listening and speaking mainly focuses on listening to the voice to answer various questions and summarize the general idea after listening to sound materials. The combination of listening and reading is to expand the number of students' reading, so that students can improve the speed of reflection when listening, and can understand the meaning of the original text. The combination of listening and writing is to test students' mastery of word pronunciation, word spelling, sentence structure, etc. The form of organizing teaching breaks through the shackles of traditional teaching, gives students the initiative and choice of learning, and divides English listening teaching into three levels, namely, early listening, middle listening, and late listening. After these three stages, students' autonomous learning ability and their subjective initiative in learning can be improved. Put students and teachers together in the teaching design of the listening teaching course, fully consider the self-evaluation and mutual evaluation of learners in the learning process, and on this basis, achieve a good match between the teaching content and the characteristics of learners. The overall system architecture is shown in Fig. 6.

The presentation layer is the interface between users and the system. It requires strong usability and interactivity. Users can exchange data with the business layer through the presentation layer.

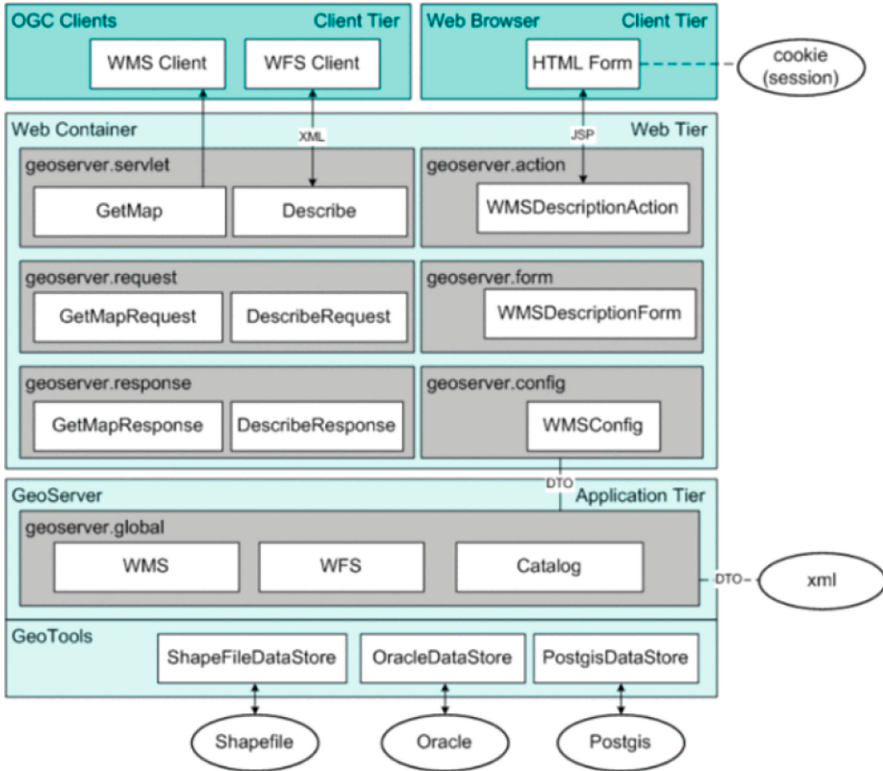


Fig. 6. The structure of English listening teaching system

The business layer is the middle layer that connects the presentation layer and the data layer. It includes data processing module, comparison and analysis module, data preprocessing module, data mining module and other parts. The presentation layer and data layer can only exchange data through the middle business layer. The three-tier structure has strict data access permission control, which is set for the security and operating efficiency of the system.

The data layer includes the data required for system operation, and some temporary data during operation are also stored in the data layer.

5 Conclusion

To sum up, the three-dimensional virtual immersive environment has a crucial impact on students' English listening ability. Students are more likely to devote themselves to English listening learning in the immersive environment. At the same time, the virtual immersion English listening teaching mode can provide a good language learning environment for students, so that students' English listening level can be greatly improved under the immersion teaching environment.

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