



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

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**Abstract.** For most non computer professionals and some computer professionals, data mining and machine learning are two advanced fields. In the author's opinion, this may be a habitual misconception, rather than an added aliof of attributive shere. This article applies data mining technology to an English online learning platform, analyzes learners and learning content through clustering algorithms and association rules, and develops a donetics algorithm based on a content organization system. In this example, we use this algorithm to provide personalized learning content for learners, hoping that this system can be extended to online learning platforms in the future. The concept of data driven alerts (DDL) has attracted the attention of all researchers. Data driven English machines are an inevitable trend to improve college students' English learning efficiency and autonomous learning ability.

**Keyword:** Data mining · English learning · Online platform · Virtual Reality Technology

## 1 Introduction

With the progress and development of science and technology, many images have become hot spots with theoretical value and practical significance in the fields of educational reform practice, online teaching, electronic bags, and so on. "One of the new concepts of English teaching reform is human-computer linguist". "Human machine dialogue" is an effective method of English curriculum reform. This new model provides an effective teaching method for many cities. The radial form of "Everyone talking" in GlishTests [1, 2]. However, for a long time, the form of "Man Men" in English testing has been "Everyone talking". Therefore, the current English teacher "Teaching English, a method for students to learn English" - ODS will has the greatest impact on "man-machine dialogue". The mode of "man-machine dialogue" has promoted the active exploration of various schools and reformed English listening and speaking. This test mode has not been met in an orderly manner, and these schools will continue to create favorable

economic conditions. Therefore, we will continue to explore the “human” machine language “test mode to address the current evaluation reform: evaluation includes an important component of the English curriculum [3]. “Timely and effective monitoring of fresh fruits and positive vegetables in order to improve their scientific, complex, and effective evaluation, it is important to ensure the regionalization of curriculum objectives. Subsequently, the press conference reformed the equality of basic English subjects, and proposed new requirements to strengthen the equality of basic English subjects, especially exploring the” man-machine dialogue “test mode”.

However, traditional Chinese and English exams mainly include listening, grammar, reading, and writing. An oral test, in the form of spoken English, is a useful related test or is not considered a minimum score. This MakeSmosten Chinese English learner has excellent reading and writing skills. “ForAlonTime. Forever” in Dumbe State is being cultivated by Chinese English, “Lackof for Transparency has caused most Chinese English learners to have more or less non-standard pronunciation, which is a challenge for them. ASA language English has lost its important communication function. This situation has also attracted the attention of the educational community, and it is hoped that this situation can be improved, such as English teaching and strengthening oral training. However, these reforms have made slow progress,” Making it difficult for this phenomenon to achieve results in a short time.

“Generally speaking, exposure to a pure English environment is the best option for practicing oral English skills. Therefore, students will practice oral English in an orderly manner. Many people will participate in their Horror English County during the Holi Festival, OrtakeThem, and various business English training organizations to improve learners’ oral English skills through learning and communication. Eat with people from English speaking countries”. “These exercises can be done independently, but they require real practice, time, and Andrew’s practice, not all family practice.”

Virtual reality (VR) creates a representative virtual environment that enables users to achieve immersive experiences [4]. Through virtual helmets, learners can completely escape the external physical and virtual worlds. This technology brings the possibility of creating an English learning system through VRDevice ES, providing learners with a WithUlly Immersive English English Environment, allowing them to enter this virtual world. I believe that in order to improve their income and experience.

In the 20th century, researchers attempted to establish a virtual language learning environment. These researchers work in research institutions and university laboratories Most Virtual Environment Sare Nommer Sive “DeskTopvr” “A fully Commerce Sive Vr System Requirement Support of Variaous Professional AI external Verdevices, SuchashElmetDisplays, DigitalGloves, PositioningController, and other departments work [5]. VreEnglish learning scenarios require expensive time, such as ButtnowVariaousAffordEverdeViseShaveBeenvented, SuchashTcVive, Oculus Rift, Gearvr, and others. Among them, Canada has achieved virtual language “AgeLearning Environment Afforda BIPrice”°. Isshownin, Fig. 1 below.

For VR, artificial intelligence (AI) technology is an important control system. Intelligent dialogue is the foundation for learners to communicate and interact with intelligent virtual computers. Automation is a virtual computer with low cognitive abilities that can understand and master the appropriate language and respond. Speed driven



**Fig. 1.** VR English Learning Scene Experience

panel/lip synchronization enables virtual features to be re validated during presentations [6]. The demonstration simulation is shown in Fig. 2 below.



**Fig. 2.** Demo Simulator

## 2 Related Work

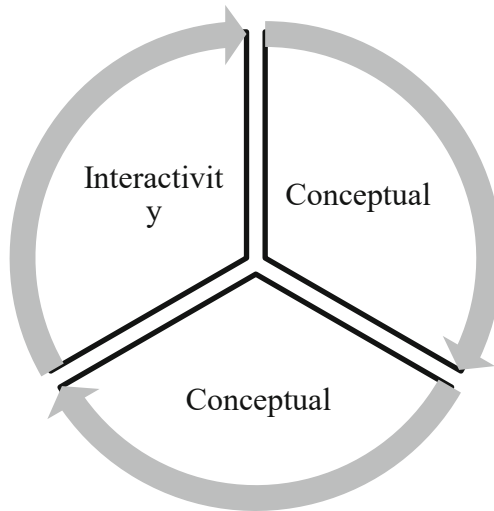
### 2.1 Concept and Characteristics of VR

Virtual Reality (VR) is a highly interactive, computer-based multimedia environment. In this environment, users become participants in the 'virtual reality' world. Broadly speaking, virtual reality refers to a fast and intuitive interactive computer system in

which users often forget to be in it [7]. Virtual reality technology integrates various high-tech technologies such as computer simulation technology, computer graphics technology, multimedia technology, sensor technology, and network technology to achieve a three-dimensional virtual environment similar to real life environments, such as realistic viewing, listening, and touching [8]. Through the Internet of Things, sensors, and other technologies, users can interact and experience objects in the virtual environment in a natural manner.

The 31 characteristics of virtual reality proposed by Grigore Burdea and Philippe Coiffe in their book “Virtual Reality Technology”, namely, interactivity, immersion, and imagination, effectively summarize the unique experience that virtual reality, a brand new information technology, can bring to people. Sherman and Craig (2003) “Divide immersion into spiritual immersion and sensory immersion, both of which are key to creating successful experiences in VR. Users collect information by interpreting visual, auditory, and tactile cues, while using proprioception systems to navigate and control objects in a synthetic environment to achieve sensory immersion. Mental immersion refers to the state of ‘deep participation’ in a “VR environment” [9].

Figure 3 shows the 31 features of virtual reality and the classification of immersion.



**Fig. 3.** Virtual Reality 31 Features

These characteristics of VR are very suitable for language teaching [10]. “The VR learning environment includes multiple human intelligence essences: oral/language, logic/mathematics, hearing, space, motion, interpersonal relationships, self cognition, and so on”. Learners will forget that this is still a learning environment, and they naturally output language under the stimulation of the environment. Compared to a real person training environment, VR provides a more secure, private, and neutral simulation environment. Learners don’t have to worry about making mistakes or losing face, and dare to speak up. The characteristics of immersive teaching VR technology and the experience

it brings will bring great changes to the way, thinking, and methods of education. This emerging form of education, due to its advantages, will occupy a very important position in the field of education in the future.

Situational cognitive theory has been applied to foreign language learning practice, resulting in a large number of learning methods such as contextual learning, role playing, and story centered curriculum. Many foreign language learning studies have affirmed the importance of context. The research report of Oxford Scarcella (1994) pointed out that the most effective foreign language learning strategy is to speculate based on context. Solveig (1995) [11] found that expressing commands in the context of a story can improve foreign language understanding and listening skills. De Figueiredo (2005) [12] pointed out that context is more important than content itself. Content needs to be presented in a balanced, organic, and appropriate environment and strategy to improve students' insight and discovery abilities. Real language environments leave learners with nowhere to hide, forcing them to think, speak, and write in the target language. Compared to traditional "cramming learning", situational learning can deepen and integrate the knowledge points in textbooks.

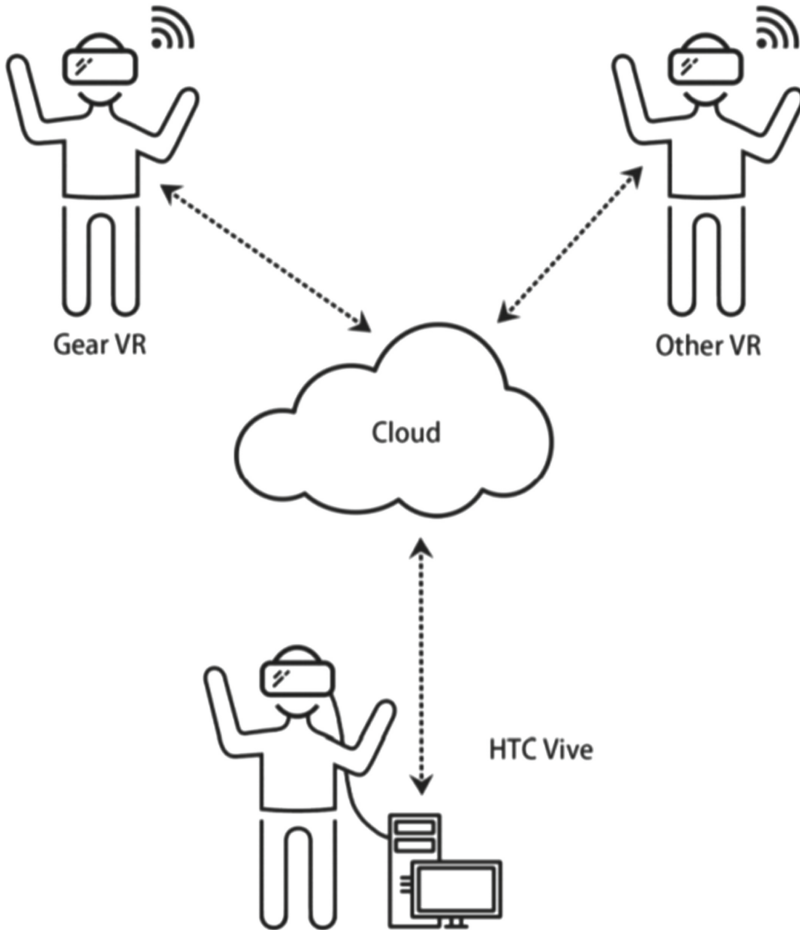
VR technology enables a comprehensive simulation of "situations". VR can be easily implemented in real life environments, as well as real feedback on events and actions. People, objects, and weather in a VR environment can follow the same rules as in real life, featuring interactivity, physical demonstration, real-time response, and more controllability than in a real environment [13]. For example, in face-to-face communication with real people, it is difficult for learners to obtain conversation records to provide valuable data. VR can store the conversation process and even the environmental changes during the process, making it convenient for users to practice and improve repeatedly. As shown in Fig. 4 below, multiple learners using different VR devices are online simultaneously through the network.

## 2.2 Establishment of English Corpus in Virtual Environment

One of the core is the interaction between learners and AI roles, allowing AI roles to simulate a pure language environment, and to achieve all this, it is necessary to integrate AI technology. Among them, speech recognition is the most fundamental and crucial technology, which is a bridge to help virtual AI characters and learners communicate. However, due to the fact that learners' English pronunciation is more or less non-standard, errors often occur in speech recognition and the recognition rate is not high [14]. In order to solve this problem, it is necessary to conduct specialized modeling of Chinese English learners' English pronunciation. Therefore, this paper constructs a corpus specifically for Chinese English learners.

In linguistics, a corpus is a large set of structured text (usually stored and processed electronically). Generally speaking, real corpus needs specialized processing before it can become a useful corpus [15]. Corpus is the basic database for many natural language processing technologies, including large-scale corpus based speech recognition technology, phonetic conversion technology, automatic text proofreading technology, syntactic analysis, machine translation, intelligent dialogue, and so on.

This article constructs a SELL (Second Language Learning) corpus, which is recorded by English learners from multiple Chinese dialect regions and is suitable for



**Fig. 4.** Multiple learners using different VR devices are online simultaneously through the network

Chinese L2 learners [16]. This corpus includes volunteers from seven major dialect regions in China: Mandarin, Cantonese, Wu, Xiang, Min, Hakka, and Gan. It is a 31.6 h oral corpus recorded by 389 volunteers (186 males and 203 females) through reading and formulating materials, with a sampling rate of 16 kHz. In addition to being used for speech recognition (especially for spoken English by Chinese English learners), the corpus also includes manually calibrated files for phoneme alignment and mispronunciation records, which can be used for mispronunciation detection and pronunciation evaluation.

The steps for building a SELL corpus are roughly as follows:

- 1) Text filtering: Select text from free copyrighted e-books as audio recording material.
- 2) Audio collection: A low-cost and lightweight WeChat applet is used to widely collect recorded audio from all over the country.

- 3) Data review: Review the audio uploaded by volunteers online and feed back the review results to the volunteers.
- 4) Audio processing: Conduct post-processing such as noise reduction on filtered recorded data.
- 5) Phoneme tagging: Manually tagging phonemes by extracting partial recordings from each dialect region.

In the overall process of corpus collection, all volunteers can record their own recordings without the supervision and management of corpus operators, greatly reducing time and labor costs.

All audio recording materials in the corpus are sourced from Gutenberg Project 6, which specifically collects free copyright e-books [17–19]. The downloaded txt documents are uniformly filtered and processed through code scripts. Finally, a total of 11000 sentences were selected. According to statistics, the coverage rates of single factor, double phoneme, and triple phoneme of these sentences were 100%, 88.90%, and 31.21%, respectively. Among them, the list of monophones refers to the 39 monophones listed by cmubet ‘, while the list of diphones refers to the 1052 diphones listed on Diphones 8. Due to the lack of a reference list, this article randomly mixed 38649 tri phonemes using code [20]. And statistically obtain the results described above. The corpus entry interface is shown in Fig. 5 below.

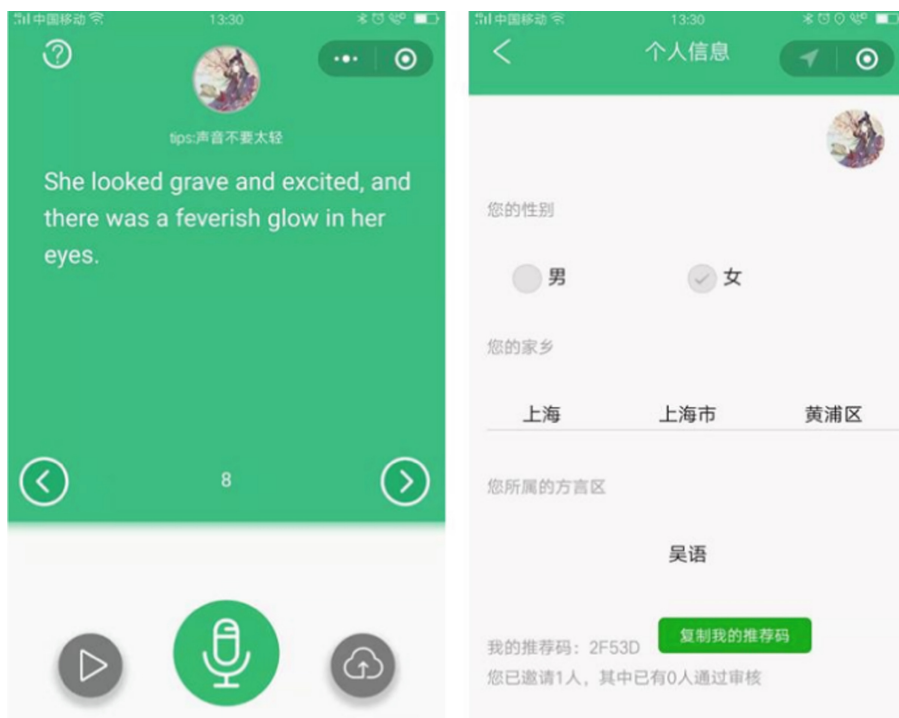


Fig. 5. Corpus entry interface

### 3 System Design and Implementation

This study mainly involves two systems: VR English learning system and computer desktop English learning system. The former was used for oral English learning in the experimental group, while the latter was used for oral English learning in the control group. In order to control variables, the learning content and process of the two systems need to be consistent. The only difference between the two systems is that the former contains “immersive scenes,” while the latter does not.

The research and development of VR English learning system mainly includes curriculum design, scene design, and system development. The course design mainly determines the learning content of English conversation; Scene design starts from the learning content and designs a virtual scene where English conversations take place; Finally, use appropriate development tools to build virtual reality scenarios.

The computer desktop English learning system does not include scene design, and the rest is the same as the VR system.

#### Course content.

The course of this study is based on story scenes, where students learn dialogue content through role playing. This study focuses on the impact of virtual scenes on learning experience and anxiety, so it is necessary to avoid other possible variables, such as student achievement, difficulty of dialogue materials, and so on. In this study, the course content of the experimental group and the control group is completely consistent, and the content difficulty design is “extremely simple” for the ability of the subjects to eliminate the result deviation caused by the content difficulty as much as possible. It is worth noting that the dialogue content in this experiment is not typical and only serves to assist in scene design and control experimental variables.

Vision is the most important way for humans to receive information, and the visual presentation effect is a decisive factor in virtual reality scenes. Based on the content of the courseware, this study designed and built a conference room scene, which includes a virtual environment and virtual characters.

The environment involved in the course content is mainly the indoor environment of the conference, as shown in Fig. 6.

Doing actions according to instructions reflects the learning method of TPR body action feedback, which can better help learners understand the content. It is worth noting that this process requires the supervision of an assistant classmate to ensure the safety of learners.

In a virtual scene, users can view the world from their own subjective perspective, and in Unity 3D, the camera component is used to achieve the first viewing angle. The camera is the user’s eyes, which receive image information from the virtual world. After running the Unity project, you can see the virtual world from the first perspective on the computer screen. In VR systems, users see the world in their head display. Download the SteamVR plug-in in Unity3D, and use the CameraRig prefabrication in the plug-in to transfer Unity3D virtual world information to the VR helmet in real time. The camera rig prefabrication includes VR head display interaction (visual and auditory), and handle interaction (buttons and vibrations). Set the main camera of Unity to Camera (eye) in the camera rig to complete the first perspective tour in the VR helmet.



**Fig. 6.** Conference Room Environment

HTC VIVE's tracker has already implemented the tracking of helmets, and the movement of helmets represents the movement of users' positions. Therefore, when a user walks, the HTC VIVE tracker can capture the user's displacement data in real-time and automatically adjust the virtual world to follow the user's movement. Therefore, there is no need for additional scripting for changes in the first visual angle presentation information caused by user displacement.

## 4 System Experiment

After the completion of the system construction, in order to ensure the smooth progress of the formal experiment, this study recruited four students to conduct a pre experiment before the experiment, two of whom completed the entire process of the experimental group, and the other two completed the entire process of the control group.

Through preliminary experiments, the following conclusions can be drawn:

In the preparation stage, it is necessary to ensure that the subjects fully understand the system operation and learning tasks, in order to avoid differences in learning effects caused by unfamiliar system operation during the learning process, which may affect the final experimental data.

The learning stage requires approximately 4 repetitions of learning to ensure a basic and measurable learning effect.

During the learning stage, it is necessary to keep the surrounding environment quiet to ensure the quality of learning. The experimental group needs assistant supervision to ensure safety during the learning process, while the Desktop group students complete their studies in the "little black room".

During the real person dialogue stage, it is necessary to record the entire process with a camera for subsequent observation of the behavior of the subject (such as reaction time, gaze situation, etc.) as an objective support material for evaluating anxiety.

The interview in the feedback stage should be semi structured, focusing on collecting the user's body feeling and opinions.

The entire experimental process should be controlled within about 30 min, and the introduction language in the experimental process should be printed and posted to improve the efficiency of the experiment.

## 5 Conclusion

Designing and implementing an English teaching system based on virtual environment technology is a promising method for enhancing language learning. The system provides learners with a unique opportunity to immerse themselves in a virtual world where they can interact with language in real time, practice their skills, and receive instant feedback. The use of virtual environments also provides learners with a safe and comfortable space to try out language without worrying about making mistakes. The design of the system should be user-friendly, intuitive, and engaging to ensure that learners maintain motivation throughout the learning process. It should include various features, such as interactive games, simulations, and multimedia resources, to meet different learning styles. The implementation of this system requires sufficient infrastructure, such as computers or mobile devices with internet connectivity. Teachers must also receive training on how to effectively use the platform and provide support to learners when needed. In summary, the design and implementation of an English teaching system based on virtual environment technology has great potential for revolutionizing language education. It provides a dynamic approach that enhances learner engagement, promotes active participation, and ultimately improves language proficiency.

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