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Research Article

An Online Japanese Teaching Mode Based on Virtual Reality

Jia Liu [ID] [1] **and Yu Zou** [2]

[1]*Department of Japanese, School of Foreign Languages, Pioneer College, Inner Mongolia University, Hohhot 010070, Inner Mongolia, China*
[2]*The 601st Institute, the 6th Academy, China Aerospace Science and Industry Corporation, Hohhot 010076, Inner Mongolia, China*

Correspondence should be addressed to Jia Liu; 311986398@imu.edu.cn

With the close cultural exchanges between China and Japan, the demand and quality of Japanese talents are gradually increasing. Traditional Japanese teaching modes and measures cannot meet the basic requirements. With the rapid development of network multimedia technology and virtual reality technology, in the process of Japanese teaching, virtual reality technology is used to reform the traditional teaching mode and to improve the quality of Japanese teaching. Based on virtual reality technology, this paper studies the online Japanese teaching mode, analyses the characteristics of Japanese teaching, combines modern information technology to assist teaching, comprehensively improves the quality of Japanese teaching, and improves the traditional Japanese teaching mode. By describing the concept, basic features, and components of the AR system in detail and by introducing the virtual construction method based on the geometric model, this paper improves the traditional Japanese teaching mode and establishes the online Japanese teaching mode. Finally, the online Japanese teaching mode for one semester is applied in colleges and universities to analyze whether this mode can improve students' interest in Japanese learning and the effect of Japanese learning. The results show that 59% of the students using this mode expressed an increased interest in Japanese learning, while only 25.8% of the students not using this mode showed an increased interest in Japanese learning. 72% of students indicated that they could improve their oral Japanese performance after using this model, while 45% of students who did not use this model could improve their oral Japanese performance.

1. Introduction

60% of Chinese and Japanese learners come from colleges and universities. Most of them focus on traditional teaching through research and analysis. The lack of interaction between Japanese teaching and students, the passive imparting of knowledge, the inability of students to interact with other classmates and teachers in the classroom teaching, the focus only on the teaching of basic Japanese skills, the lack of language ability, cross-cultural communication ability, and so on have made Japanese teaching in China stagnant [1]. For this phenomenon, this paper chooses virtual reality technology research and improvement of the Japanese teaching mode and constructs an online Japanese teaching mode [2].

This paper uses virtual reality technology in Japanese teaching, designs Japanese teaching courseware for sharing on the network, uses online dictionary to find Japanese vocabulary, uses professional websites to learn Japanese knowledge, establishes Japanese corpus, enriches Japanese teaching content, and establishes a new teaching mode and teaching evaluation system [3].

The main innovations in this research process are as follows. (1) First, the basic concepts and characteristics of virtual reality technology are introduced, the components of virtual reality system are listed, and the geometric model-based virtual modeling method used in this paper is described, and it is applied to the construction of online Japanese teaching mode. (2) Detailed description of the online Japanese development process, combined with virtual reality technology, using computer technology, virtual instruments, computer multimedia technology to build online Japanese teaching mode based on virtual reality technology [4].

2. Related Work

With the rapid development of modern education, Japanese teaching has begun to use virtual reality technology (VR) and multimedia technology; and on the basis of textbooks, virtual reality technology has been used to assist teaching [5]. Nowadays, as a new technology affecting the field of education, VR technology has a greater impact on teaching methods and teaching development and has also been concerned by a large number of scholars [6]. Kowalski proposed that virtual reality technology is the key to the future computer revolution. It can apply a more intuitive and natural behavior experience in teaching, making the traditional teaching mode and effect improve effectively [7]. Demitriadou et al. of the United States created the Virtual Reality Technology and Education Laboratory (VREL) to analyze whether virtual reality technology can be applied in the field of education to compare the effects of virtual reality teaching and other educational media applications and to analyze the impact of virtual reality technology on education [8]. Nuraliev proposed to enable learners to learn independently in a 3D virtual environment. Based on the selected autonomous actions and input language characteristics, the accuracy and complexity of language input are determined, that is, the real-time interaction between the learner and the virtual learning environment is maintained. The virtual environment can provide corresponding language input from the learner's action response and from various languages, which is called the interactive teaching with strong pertinence [9]. Yalagi et al. uses software in Japanese teaching, designs seven virtual learning tasks, deeply analyzes the students'execution status in the third task, finds problems in virtual teaching, and formulates improvement measures [10]. He points out the potential and future application of VR technology in language teaching. Ma Chongyu et al. constructed a distributed virtual environment platform for teaching and learning to form a three-dimensional virtual learning environment [11]. Li et al. analysed the application of virtual reality technology in China's education and described the virtual teaching project [12] developed by the cooperative relationship between Chinese universities and computer software companies. Chen et al. established a virtual classroom with unity 3D technology as the development environment and described in detail the ideas, technologies, and functions of designing the virtual environment [13]. Hu et al. comprehensively analysed the problems of using virtual reality technology in English teaching and described the successful cases, basic theories, and models of the application of virtual reality technology in English teaching, etc. [14]. Tian uses the GTL teaching mode in the oral Japanese teaching in colleges and universities to significantly improve the quality of oral Japanese teaching [15]. Liu applied mimetic teaching and etiology in oral Japanese teaching and applied this method to teaching time with ideal effect [16].

3. Overview of Virtual Reality Technology

3.1. Virtual Reality Technology. Virtual Reality (VR) technology is formed with the rapid development of computer technology. It integrates computer graphics, system simulation, and digital image processing. It is a comprehensive and strong subject. It belongs to simulation technology. It can integrate different sensory paths such as touch, vision, and hearing to create a three-dimensional environment. Users can use transmission devices to achieve real-time virtual and interaction in the virtual environment. The basic characteristics of virtual reality technology are listed in Table 1.

3.2. Virtual Reality System. The components of virtual reality system are headphones, HMD, data gloves, as well as information input and output devices, which use virtual software and environment to establish rule structure in virtual space, image, computer processing system, sound synthesizer, etc.

Figure 1 below is a component of a more widely used virtual reality system, which consists of a virtual environment generator, a virtual environment, users, sensor components, and action devices.

3.3. Virtual Modeling Method Based on Geometric Model. Virtual modeling technology based on the geometric model, that is, GBMR abstracts the real scene according to computer graphics, constructs a three-dimensional geometric model from polygons, such as buildings, terrain, and trees. Based on this, the lighting model in the virtual environment is constructed, the control parameters and texture mapping are set, and then the software is used to control the observer's lighting, position, and blanking information, and the real-time rendering output device completes the rendering of the visual picture and realizes the roaming of this scene, as shown in Figure 2 below, which is the basic flow chart of the geometric modeling method:

The three-dimensional graphic transformation represents a brand new three-dimensional graphics formed by the adjustment, displacement movement, and rotation of the three-dimensional graphics according to the same proportion. The geometric transformation in the three-dimensional graphics is completed by homogeneous coordinate transformation relative to the coordinate axis and coordinate origin.

3.3.1. 3D Translation Transformation. Move point $P(x, y, z)$ to point $P'(x', y', z')$ is as follows:

$$x' = x + T_x, y' = y + T_y, z' = z + T_z,$$
$$T_x = x' - x, T_y = y' - y, T_z = z' - z. \tag{1}$$

The following matrix is obtained through translation transformation:

$$T = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ Tx & Ty & Tz & 1 \end{bmatrix}. \tag{2}$$

TABLE 1: Basic features of virtual reality technology.

| Characteristics of virtual reality technology	Feature description
Immersion	When users are in a fixed situational experience, they can provide users with the most authentic feeling from the three aspects of hearing, vision, and touch, which can weaken the interference caused by external things and enhance users' attention.
Interaction	Information is transmitted between the system and users in two directions, and the system can give feedback in time according to the user's behavior to guide the user's next behavior when the user is in a special situation; on the contrary, user behavior has a direct impact on the later development of system programs, which can lead to the triggering of various events.
Imagination	Conceptuality is human imagination, which uses technology to simulate situations that do not exist or cannot exist in the real environment
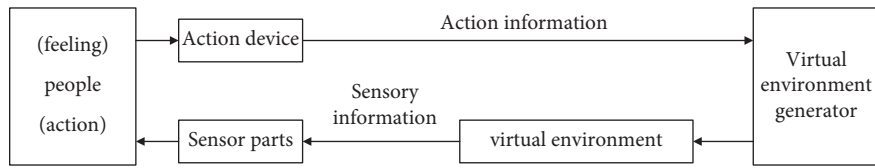
FIGURE 1: Virtual reality system.
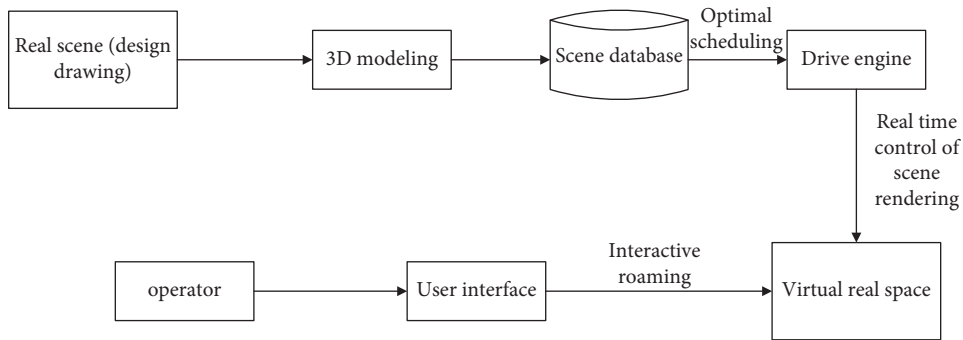
FIGURE 2: Flow chart of the geometric modeling method.

The following are the translation coordinate transformation of points:

$$[x' \ y' \ z' \ 1] = [x \ y \ z \ 1] \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ Tx & Ty & Tz & 1 \end{bmatrix} = [x \ y \ z \ 1]. \quad (3)$$

3.3.2. 3D Scale Transformation. If the coordinate transformation $P(x, y, z)$ is the vertical coordinate axis of the object center relative to the coordinate origin, set the transformation proportion as a, b, and c. If the three proportions are equal, the object needs to be transformed in real time and equal proportion. After transformation, the $P'(x', y', z')$ coordinate is obtained, and its transformation matrix is as follows:

$$T = \begin{bmatrix} a & 0 & 0 & 0 \\ 0 & b & 0 & 0 \\ 0 & 0 & c & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}. \quad (4)$$

The following is the calculation formula of point scale change coordinates:

$$[x' \ y' \ z' \ 1] = [x \ y \ z \ 1] \begin{bmatrix} a & 0 & 0 & 0 \\ 0 & b & 0 & 0 \\ 0 & 0 & c & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} = [x \ y \ z \ 1]T. \quad (5)$$

3.3.3. 3D Rotation Transformation. When the object rotates around the coordinate axis, the transformation point $P(x, y, z)$ will be $P'(x', y', z')$. The corresponding P' transformation matrix is also different due to different coordinate axes.

If point P rotates around the X axis, the following transformation is obtained:

$$x' = x, y' = y \cos \partial - z \sin \partial, z' = y \sin \partial + z \cos \partial. \quad (6)$$

The following transformation matrix is obtained:

$$T = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & con\,\partial & \sin\,\partial & 0 \\ 0 & -\sin\,\partial & con\,\partial & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}. \quad (7)$$

After the transformation of point P with the X axis as the center, the following coordinate transformation is obtained

$$[x'\ y'\ z'\ 1] = [x\ y\ z\ 1] \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & con\,\partial & \sin\,\partial & 0 \\ 0 & -\sin\,\partial & con\,\partial & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} = [x\ y\ z\ 1]T. \quad (8)$$

After point P rotates around the Y axis, the following transformation formula is obtained

$$[x'\ y'\ z'\ 1] = [x\ y\ z\ 1] \begin{bmatrix} con\,\partial & 0 & -\sin\,\partial & 0 \\ 0 & 1 & 0 & 0 \\ \sin\,\partial & 0 & con\,\partial & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} = [x\ y\ z\ 1]T. \quad (9)$$

The following coordinate transformation formula is obtained during the rotation of point P with the Z axis as the center

$$[x'\ y'\ z'\ 1] = [x\ y\ z\ 1] \begin{bmatrix} con\,\partial & 0 & -\sin\,\partial & 0 \\ 0 & 1 & 0 & 0 \\ \sin\,\partial & 0 & con\,\partial & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} = [x\ y\ z\ 1]T, \quad (10)$$

where ∂ represents the rotation angle centered on the P axis.

4. Online Japanese Teaching Mode

4.1. Development of Japanese Teaching. The development stage of Japanese teaching focuses on resources and means. The use of computers can improve teachers' correcting homework methods and lesson preparation modes. The use of computer multimedia technology in learning methods can also be adjusted to help teachers teach and change students' learning methods. Virtual reality technology provides Japanese teachers and students with a large number of Japanese resources, and the network provides them with a platform for communication and learning. The development process of Japanese teaching is listed in Figure 3.

According to the development process of Japanese teaching shown in Figure 3 above, the research on online Japanese teaching mode in China is still in its infancy. Teachers regard online teaching as a way to supplement traditional teaching in Japanese teaching. Japanese teaching and online teaching are not dominant in the process, and the main position of Japanese online teaching is not involved. Compared with English online teaching, Chinese teaching, and online English teaching, Japanese teaching mode is relatively backward [17].

4.2. Japanese Online Learning Mode. Online teaching can also be called e-learning. It is a new teaching mode formed under the rapid development of Internet technology, which is used to supplement and extend the traditional classroom teaching [18]. Online Japanese teaching based on virtual reality technology can obtain a large number of online education resources, and students can realize independent teaching, so as to break the disadvantages of Japanese online learning and enable students to obtain Japanese teaching resources at any time [19]. The following are the basic forms of Japanese online teaching.

(1) Share Japanese teaching courseware on the network. Japanese teaching teachers upload personal Japanese teaching materials, teaching contents, teaching courseware, etc. to the cyberspace, which mainly includes interactive learning communities, shared spaces, personal blogs, and QQ groups. In the process of learning Japanese, students preview and review the teaching content from their personal needs. This form is to supplement the Japanese classroom teaching.

(2) Online dictionary. One of the main tools in foreign language teaching is dictionaries. Nowadays, the rapid development of network technology has strengthened the professionalism of dictionaries. Students can access online dictionary software by using the network, such as primary school library dictionary, Google translation, and Baidu translation. With the rapid development of network technology and virtual reality technology, software developers have launched an online Japanese Teaching Dictionary applied on the mobile client. Users can access the contents of the Japanese dictionary after downloading the client on the mobile phone.

(3) Professional website. At present, common learning websites include Japanese learning blogs and Chinese websites for Japanese learning. These websites regularly upload materials such as Japanese introductory courses, Japanese examination contents, Japanese practical sentences, business English, or online courses and also provide students with a virtual interactive area for communication and communication between students.
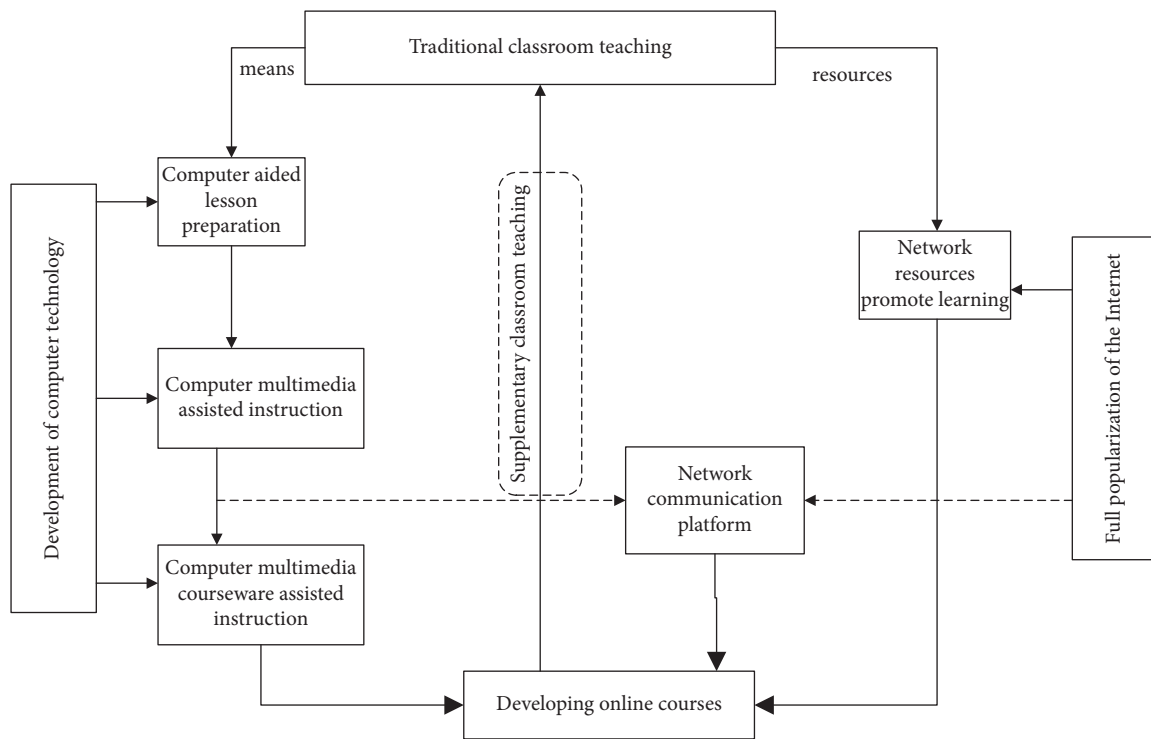
Figure 3: Development process of Japanese teaching.

(4) Online broadcast. Students can use online radio to practice personal listening, including TBS and NH.

(5) Corpus. The knowledge base required for learning Japanese is corpus, which contains various professional resources required for learning Japanese. Users can download and use the corpus free of charge.

4.3. Japanese Online Teaching Mode. This paper draws lessons from the traditional Japanese teaching mode based on the combination of teaching practice and virtual reality technology, deeply analyzes the characteristics of Japanese Teaching in Colleges and universities, and summarizes various teaching modes suitable for Japanese online teaching, as shown in Figure 4.

Based on virtual reality technology, this paper studies the online Japanese teaching process from the perspectives of teachers and students. The teaching inquiry stage belongs to the early preparation process of teachers, and the teacher preparation stage involves teaching analysis, inquiry preparation, and problem description [20]. The teacher analysis stage mainly includes analysis of learning tasks, analysis of learning characteristics, feasibility analysis of solving problems, and analysis of three-dimensional teaching objectives. The inquiry preparation process is the basis for students' learning, including the required learning tools, platforms, and courseware. Students' inquiry learning is to complete inquiry activities in a certain area designated by the classroom. The classroom sets the problems to be studied and briefly analyzes the inquiry theme before students' initial inquiry.

Students complete learning activities in the virtual environment, first get familiar with and practice the teaching instruments and virtual instruments used in online Japanese teaching, then complete Japanese teaching exploration, communicate with peers after teaching, and then analyze and reflect on the exploration process. After that, teachers conduct self-evaluation and evaluate students' learning situation. Teachers realize the design of online Japanese teaching mode according to students' learning status.

5. Result Analysis of Online Japanese Teaching Mode Based on Virtual Reality Technology

5.1. Analysis on the Influence of Online Japanese Teaching Mode on Students' Interest. This paper studies the online Japanese teaching mode based on virtual reality technology and constructs an online Japanese teaching mode suitable for students. By applying this mode to college teaching, this paper analyzes and tests the effect of the actual Japanese teaching mode. This paper analyzes the impact of online Japanese teaching mode on students' learning interest. Interest is the main driving source for students to learn Japanese. Therefore, only after improving students' interest can students mobilize their motivation to participate in teaching activities and change students' previous passive learning mode to active learning. It can be seen that interest is the key to improve students' oral Japanese ability. Based on the virtual reality online Japanese teaching mode, this paper completes the design of teaching activities and teaching resources from students' preferences and actual needs so as to obtain students' interest in Japanese learning.
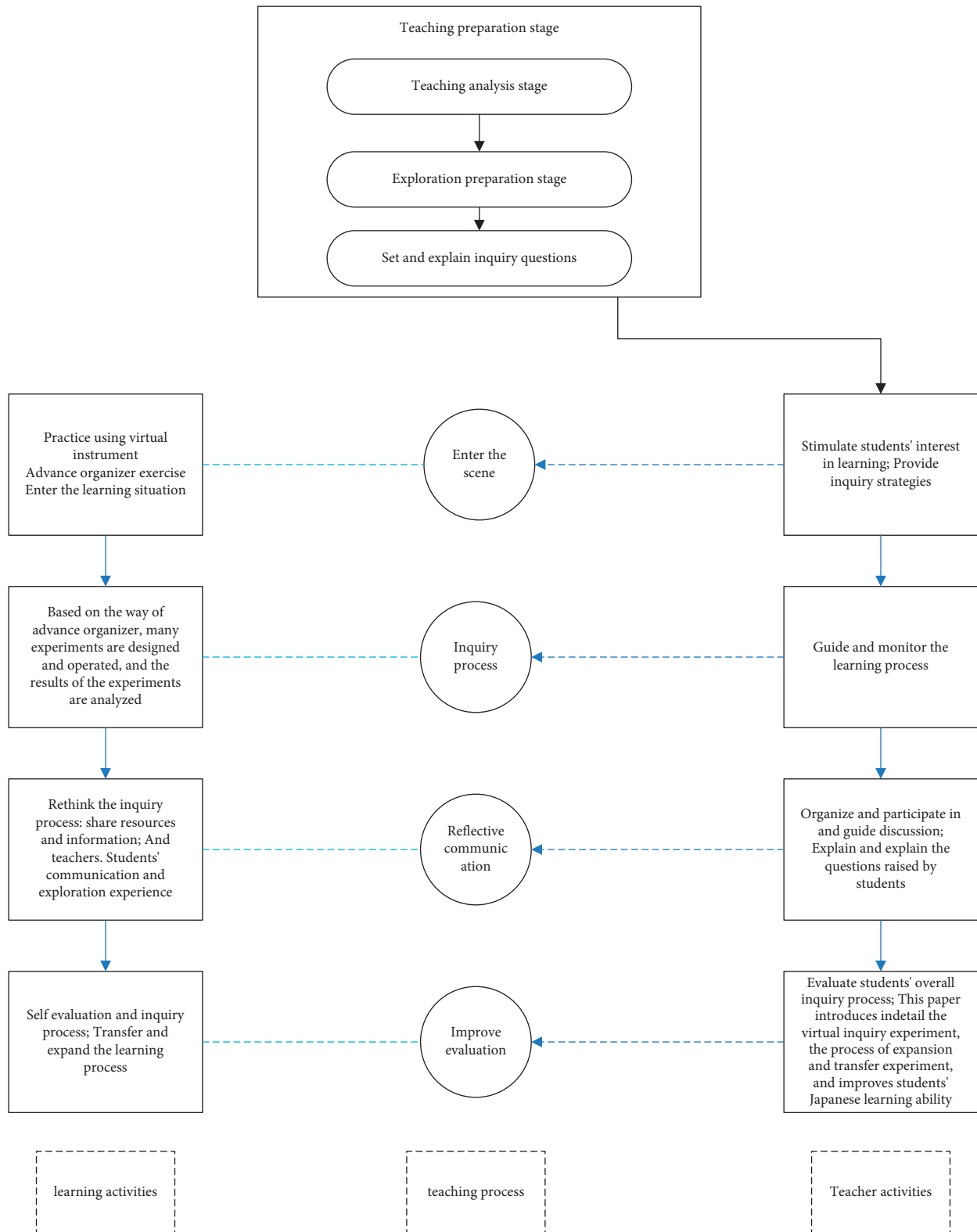
Figure 4: Online Japanese teaching mode based on virtual reality technology.

Through the investigation of students' interest in oral Japanese learning, this paper is divided into five different levels for the problem of "degree of interest in oral Japanese courses." Among them, the students in the experimental group use the online Japanese teaching mode based on virtual reality technology, and the students in the control group use the traditional Japanese teaching mode. The analysis of students' interest in learning Japanese by the two
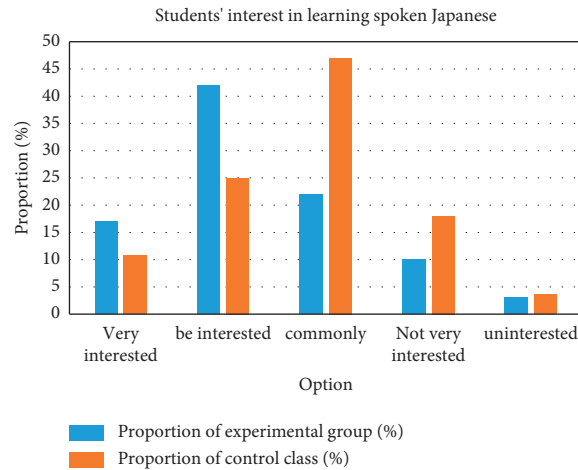
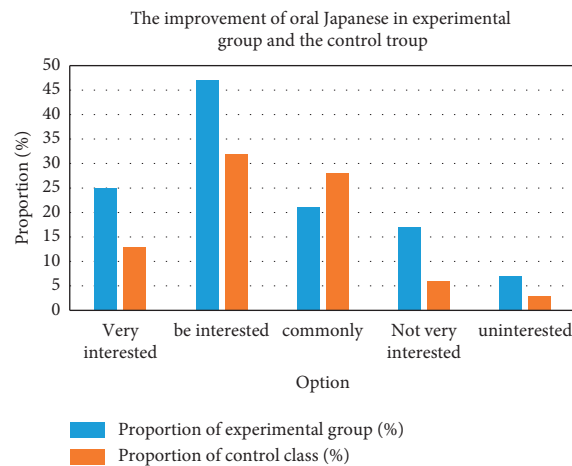FIGURE 5: Students' interest in learning spoken Japanese.

FIGURE 6: Improvement of oral Japanese in the experimental group and the control group.

different teaching modes is compared and analyzed, as shown in Figure 5.

According to the data in Figure 5 above, 17% of the students in the experimental class are very interested in learning Japanese, and 10.8% of the students in the control class are very interested in learning Japanese. 42% and 25% of the experimental class and the control class are interested in learning Japanese, respectively, and 22% and 47% of the experimental class and the control class are generally interested in learning Japanese, respectively. Combined with the data, it shows that the students in the experimental group are generally more interested in learning Japanese than those in the control group, which fully shows that the online Japanese teaching effect of virtual reality technology in colleges and universities is remarkable and can improve students' interest in Japanese learning.

5.2. Analysis on the Influence of Japanese Learning Effect. After using the online Japanese teaching mode based on virtual reality technology in the actual Japanese teaching for one semester, the students' learning effect and oral Japanese

performance were investigated and analyzed. The students in the experimental group used the Japanese teaching mode, while the students in the control group did not use the online Japanese teaching mode. Through comparative analysis, the effect of applying the online Japanese teaching mode was analyzed. The set question is "whether there is a great improvement in personal Japanese expression ability after one semester of Japanese teaching." Figure 6 shows the results of the experimental group and the control class.

Analyze the improvement of oral Japanese of students in the experimental group and the control group in Figure 6 above. The proportion of students in the experimental group and the control group who can greatly improve their oral expression ability is 25% and 13%, respectively, with a difference of 12%. 47% and 32% of the experimental group and the control group said that their oral English level had improved, respectively, and 21% and 28% of the experimental group and the control group said that their oral expression ability had not been significantly improved, respectively. According to the data, the oral expression of students in the experimental group is much higher than that in the control group, which fully shows that the online

TABLE 2: Oral Japanese achievement.

	Class	Number of cases	Average value	Standard deviation	Standard error mean
Interim results	Experimental class	30	69.75	16.5	3.1
Test results	Control class	28	64.8	17.7	3.4

TABLE 3: Independent sample test of students' oral Japanese performance in midterm.

		Variance equivalence test		Variance equivalence test					Variance equivalence test	
									Difference 95% confidence interval	
		F	Significance	t	Freedom	Sig	Average value	Standard error value	Lower limit	Upper limit
Interim results	Assuming equal variance	059	809	1042	57	0.14	4.7	4.5	4.29	13.7
	Assumed variance inequality			1039	54.9	0.14	4.7	4.51	4.33	13.8

Japanese teaching mode can significantly improve students' oral Japanese ability.

Then, sort out the oral Japanese test results of the experimental class and the control class twice, using SPSS 25.0 software to process the data and test the students' Japanese learning effect according to the performance of the experimental group and the control group. Table 2 shows how to use SPSS 25.0 software statistical analysis of the results of oral Japanese test in the experimental class and the control class.

In Table 2 above, the average Japanese oral performance of the test experimental class is 69.75, and the average Japanese oral performance of the test control group is 64.8. Compared with the experimental class, the oral performance of the two classes is higher. Further, independent sample t-test analyzed the performance of the two groups of students, and the results are shown in Table 3 below.

Table 3 shows the test results of this sample t, and the t distribution value and significance are 1.5%, respectively, 042 and 0.013, indicating that the oral Japanese test scores in the experimental class and the control class are significant. After one semester of online Japanese teaching, the oral Japanese level of the experimental class is much higher than that of the control class, and its performance is also higher, which fully proves that this teaching mode can improve the students' oral Japanese performance and quality.

Compared with the traditional Japanese teaching mode, this paper uses the online Japanese teaching mode based on virtual reality technology, which has strong flexibility in teaching design. Completing the teaching design according to students' interest can better stimulate students' interest in learning Japanese and improve students' initiative and enthusiasm in learning Japanese. The teaching form is highly comprehensive. Combined with the online and offline teaching mode, it guides students' learning attitude and learning mode and constructs a self-management and adjustment mechanism to make students have a good habit of learning Japanese.

6. Conclusions

The traditional Japanese teaching mode focuses on classroom teaching, and teachers play a leading role in the teaching process. In the classroom, teachers analyze the Japanese text for students. However, this Japanese teaching mode cannot make students integrate into the Japanese situation, and it is difficult to feel the fun of Japanese learning. Students' learning and teachers' teaching process are boring, which makes students lose interest in Japanese learning. Students are unable to play their main role during their study, resulting in an unsatisfactory learning effect. At the same time, the trade between China and Japan has been close in recent years, which requires a large number of Japanese talents. The students trained by this teaching mode are not competent for the job requirements. Therefore, it is urgent to reform the traditional Japanese teaching mode, use new teaching methods to improve teaching quality, and strengthen students' oral teaching. Therefore, this paper uses virtual reality technology to study the online Japanese teaching mode, uses the most advanced multimedia teaching, deeply excavates Japanese teaching resources, and uses computer and network for auxiliary teaching to construct the online Japanese teaching mode, which is widely used in colleges and universities. This paper analyzes from two aspects: Affecting students' interest in Japanese learning and affecting students' Japanese learning effect. The experimental group and the control group are set for comparative analysis. The results show that the scores of students in the experimental group are higher than those in the control group.

Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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