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Retraction

Retracted: Deep Learning Analysis of English Education Blended Teaching in Virtual Reality Environment

Scientific Programming

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

In addition, our investigation has also shown that one or more of the following human-subject reporting requirements has not been met in this article: ethical approval by an Institutional Review Board (IRB) committee or equivalent, patient/participant consent to participate, and/or agreement to publish patient/participant details (where relevant).

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] W. Wu and C. Qiu, "Deep Learning Analysis of English Education Blended Teaching in Virtual Reality Environment," *Scientific Programming*, vol. 2022, Article ID 8218672, 11 pages, 2022.

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Research Article

Deep Learning Analysis of English Education Blended Teaching in Virtual Reality Environment

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The rapid development of computer software and hardware, network technology, and various Internet platforms has brought mankind into a new era. In recent years, "virtual reality" can be regarded as a huge hot spot, whether in the field of industry, education, or research. At present, although the heat has subsided a little, the technical teams involved in various fields are also working collectively to continuously innovate. Based on the mixed teaching mode of English education, this article conducts in-depth research on deep learning and virtual reality technology, integrates deep learning and virtual reality learning environment, and builds a learning model of English education learning environment based on virtual reality. The teaching design of the course aims to fully combine the main content of deep learning with the virtual reality environment. Through experimental research, it is explored whether the learning environment based on virtual reality can promote deep learning. The relevant data of the experimental class and the control class are collected through questionnaires, starting from the four dimensions of motivation dimension, investment dimension, strategy dimension, and result dimension, and conduct a comparative analysis, and use the auxiliary interview method to understand the experience of students and teachers on virtual reality equipment and put forward relevant suggestions.

1. Introduction

With the continuous development of society and the continuous integration of education and information technology, the country's education informatization has also ushered in rapid development. The continuous popularization of the Internet, virtual technology, cloud computing, etc. provides education with an interactive and cooperative teaching environment of "Internet +." The rapid development of these technologies will promote the development of education and teaching, and change the demand for talents and the form of education. Among them, the rise and development of virtual reality (VR) technology will have an increasingly important impact on future education forms. As a new technology applied to the field of education, virtual reality has gradually become a brand-new educational method to help teachers teach and promote the development of education, enriching the dimension of education from the aspects of the learning process and results. Different from the traditional teaching mode and teaching environment where the teachers of traditional education stand on the podium, Internet technology and virtual reality technology are fully utilized, so that the teaching mode and students' learning environment have undergone great changes, and they can intuitively feel the real and specific This kind of learning environment relieves the pressure on schools and learner resources, can help students become participants in the learning environment, knowledge is more easily accepted and recognized by students, and promotes students' enthusiasm for learning. The continuous improvement of learning enthusiasm can make students' thinking continue to expand, and also can make students' interest in learning continue to improve, which has a very important positive effect on students' learning efficiency. It can be seen that the

in-depth application of virtual reality technology in education and teaching and the exploration of innovative education and teaching models are highly valued by the country, and the application of virtual reality in education has also become one of the main directions of virtual reality research and development. Its application will inject new vitality into traditional teaching. In the era of an increasingly informatized and globalized knowledge economy, learners are faced with complex and diverse social and learning environments. Based on this, American scholars and all walks of life have launched "deep learning" activities to help students be able to have a comprehensive understanding of people's daily life, daily work, and university life in the future. In order to achieve the goal of deep learning, teachers should adopt new and effective teaching modes and teaching strategies, so that students are not limited to shallow understanding, but stay at the shallow learning level. Students build new knowledge on the basis of existing knowledge and experience and transfer it to new situations, so as to achieve deep learning. The immersion, interactivity, and conception of virtual reality technology provide technical support for deep learning. It can not only create and reproduce the existing scenarios in reality but also create and conceive scenarios that cannot be experimented with or not in reality, which helps to effectively enhance the state of students' deep learning. Therefore, the deep learning and virtual reality learning environment integrate, build a learning model of English education blended teaching based on the virtual reality learning environment, and carry out teaching design according to the learning model and related courses, aiming to fully combine the main content of deep learning and virtual reality environment, so that students can learn more. The state of learning has been effectively improved, and the students' learning efficiency has been continuously improved [1–10].

2. Related Works

With the continuous change of VR technology, virtual reality has been widely used in medicine, education, film and television, and other fields and in the educational application of virtual reality technology. The earliest country to apply virtual reality technology in education is the United States, where it is widely used in military teaching. The research and application of VR technology in the United Kingdom is the most advanced country among all European countries; at the same time, the University of Nottingham has achieved excellent results in the application of virtual reality technology in the field of education. VR technology is used in the field of education to help students with physical disabilities and learning difficulties to further improve their learning efficiency. In virtual reality, learners interact with the learning environment according to the specific object content. This interaction is immediate, and the virtual environment can react in real-time based on the learner's behavior, for example, providing language input to learners in a targeted manner. The combination of virtual technology and education can also improve student outcomes. Research has found that students in VR English teaching classes get higher grades than other students, and VR also helps with memory retention. EdTech reports on a recent study that showed a nearly 9% increase in memory retention for students who learned in a VR immersive environment. Virtual reality technology has a wealth of practical experience in the field of education. However, there are obvious limitations in the application of virtual reality technology in today's education field. Deep learning makes virtual reality education more rigorous. Using new software and hardware equipment and combining intelligent learning environments for deep learning can better promote students' self-learning and lifelong learning. Learning, thus cultivating new talents to adapt to the development of the times. The application of virtual reality education not only provides unique advantages for learners in the learning environment, interactive environment, and experimental environment but also requires strengthening and improving the self-awareness and initiative of learners in autonomous learning, which is in line with the established goals of deep learning at all stages. Immersion, interactive functions, and conception in the virtual reality environment provide support for deep learning. Deep learning is a situation-based learning method. If knowledge cannot be applied to new and real situations to solve problems, only superficial understanding, mechanical memory, and simple copying, then this kind of learning will still remain on a shallow learning level. This research will be based on virtual reality technology combined with English education mixed teaching courseware, allowing students to experience English learning in virtual scenes, so as to carry out in-depth learning. In the process of English mixed teaching practice, virtual reality technology can provide the interaction of real role models and dialogue scenes [11–15].

3. Related Theories and Technical Methods

3.1. Virtual Reality Technology

3.1.1. Virtual Reality System. Virtual reality is a simulation technology that uses a computer to create a near-real virtual environment that is dynamic, three-dimensional, and fully immersive when the user interacts with it. According to different functions and implementation methods, virtual reality systems can be divided into four categories such as wearable virtual reality systems, desktop virtual reality systems, augmented virtual reality systems, and distributed virtual reality systems. According to the scenario materials and suggestions in the learning activities in the English teaching curriculum standards, combined with the results of the school's pre-investigation, the virtual reality system in this study is planned to use a wearable virtual reality system. Due to the uneven situation of VR hardware in schools at this stage, the selection of the type of virtual reality system will be based on the VR teaching resources and hardware status of the selected high schools' virtual reality system. Wearable virtual reality systems are also known as "immersive virtual reality systems." Users enter a virtual environment with hardware devices such as virtual reality glasses and digital helmets and then interact with the virtual environment through sensing devices such as data gloves (Figure 1) [16].

Figure 1: Selected school virtual reality device.

3.1.2. VR Teaching Resources. English teaching resources refer to many materials and conditions that can be used by teachers in all aspects of English teaching, including English course textbooks, English teaching cases, relevant English video pictures, PPT English teaching courseware, as well as teachers' resources, teaching aids, and teaching infrastructure such as desks. In a broad sense, English teaching resources can refer to all elements used by teachers in the process of English teaching, including people, money, materials, and information that support and serve teaching; in a narrow sense, English teaching resources (learning resources) mainly include teaching materials, teaching environment, and teaching support system. The VR English teaching resources in this study belong to the narrow English teaching resources in the broad and narrow sense, including (1) VR hardware equipment: wearable complete sets of virtual reality glasses for English teaching, virtual reality all-in-one machine. (2) VR software resources: virtual reality software resources that are matched with equipment, related to courses, and developed maturely. (3) VR supporting classrooms: VR supporting classrooms that can properly store and easily access VR-related hardware equipment, have enough space for students to interact and explore independently with the virtual environment, and have an interactive learning space design.

3.2. Deep Learning Theory. According to the subject core literacy and course objectives of the English blended teaching course, carefully analyze the English textbooks used, collect data on virtual reality and deep learning, and draw lessons from the famous teaching reform experts LeAnn Nickelsen and Eric Jensen in their works. Based on the study of learning, a detailed process system is constructed, and based on each link of the model, a complete deep learning process is formed (Figure 2) [17].

Based on the theoretical framework of deep learning, this research constructs a deep learning model based on a virtual reality environment (Figure 3).

Analyze the current students' understanding of virtual reality, based on the deep learning model, combine virtual reality and English courses, follow the basic principles of teaching design, and construct a virtual reality environment-based English mixed teaching curriculum design framework (Figure 4) [18–20].

4. Research Design and Result Analysis of Mixed Deep Learning in English Education Based on Virtual Reality Environment

4.1. Experimental Design

4.1.1. Experimental Theme. Through the case of a VR educational game called "In Order To Dr.," an experimental class and a control class were set up, and the traditional teaching methods and the teaching methods with the help of VR educational games were used to conduct comparative experimental teaching in the English mixed teaching classroom. Taking Unit 1: Where did you go on vacation? For the experimental class in the first week as an example, the teaching objectives are drawn up, as shown in Table 1 [21].

4.1.2. Experimental Variable. Independent variable: whether to adopt the English blended teaching-learning mode based on a virtual reality environment.

Dependent variable: whether it helps to promote deep learning, that is, whether it has achieved the promotion of problem-solving ability, communication, active cooperation, knowledge processing level, and reflective evaluation level.

Irrelevant variables: students' initial cognition, operational level, mastery of basic knowledge, and grades in English class.

Number of students, teachers, English teaching content, study hours, etc.

4.1.3. Experimental Hypothesis. In view of the existing problems in the current English mixed teaching and the current teaching practice research of virtual reality, the design and construction.

The deep learning teaching mode of the English blended teaching course is based on the virtual reality environment,

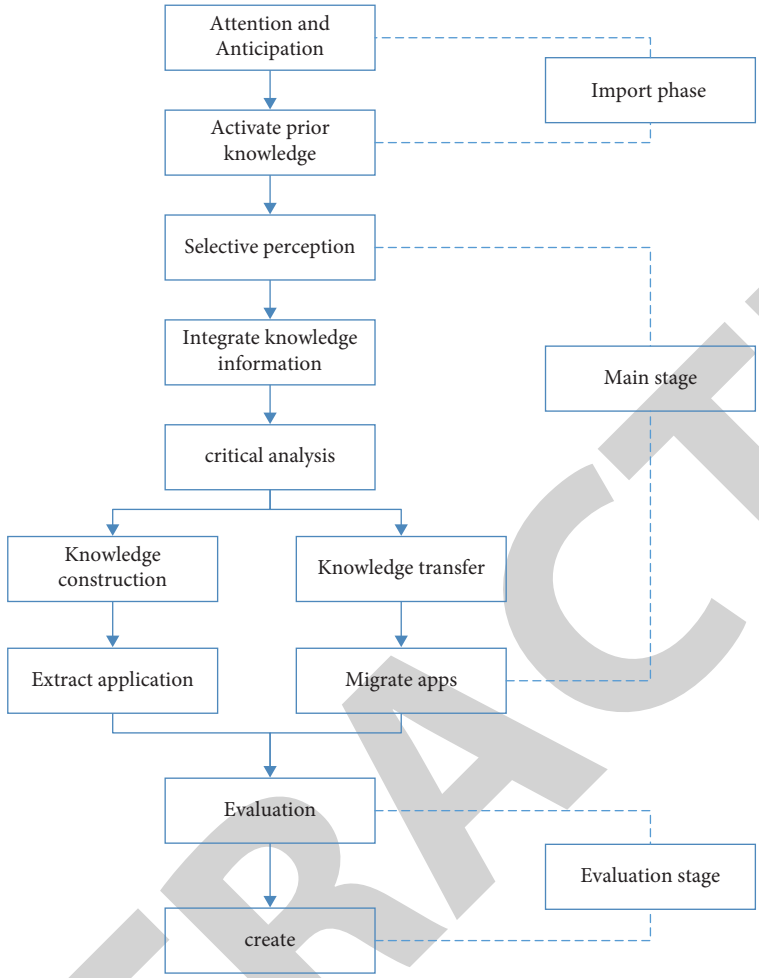

Figure 2: The deep learning process.

and the experimental research on the effectiveness of this teaching mode. The experimental hypotheses proposed in this experimental study are as follows:

Hypothesis 1. the level of deep learning in the English learning environment based on virtual reality is significantly improved compared with the control class in the traditional teaching environment.

Hypothesis 2. the motivation level in the English learning environment based on virtual reality is significantly improved compared with the control class in the traditional teaching environment.

Hypothesis 3. the problem-solving ability in the English learning environment based on virtual reality is significantly improved compared with the control class in the traditional teaching environment.

Hypothesis 4. the ability of communication, communication, and cooperation in the English learning environment based on virtual reality is significantly improved compared with the control class in the traditional teaching environment.

Hypothesis 5. the knowledge processing level in the English learning environment based on virtual reality is significantly improved compared with the control class in the traditional teaching environment.

Hypothesis 6. the level of reflective evaluation in the English learning environment based on virtual reality is significantly improved compared with the control class in the traditional teaching environment.

4.1.4. Experiment Process. According to the specific content of the research topic and the actual situation, the specific process designed in this article is shown in Figure 5.

4.2. Matching of VR Teaching Resources. Learn about school VR equipment availability. The classroom is a smart classroom that integrates modern educational technologies such as smart blackboards, smart tablets, smart recording and broadcasting, and VR teaching equipment. In order to promote students' communication and discussion, the desks are set up with closed polygons, and the classroom setting conforms to the characteristics of the teaching mode designed in this study, which is mainly based on

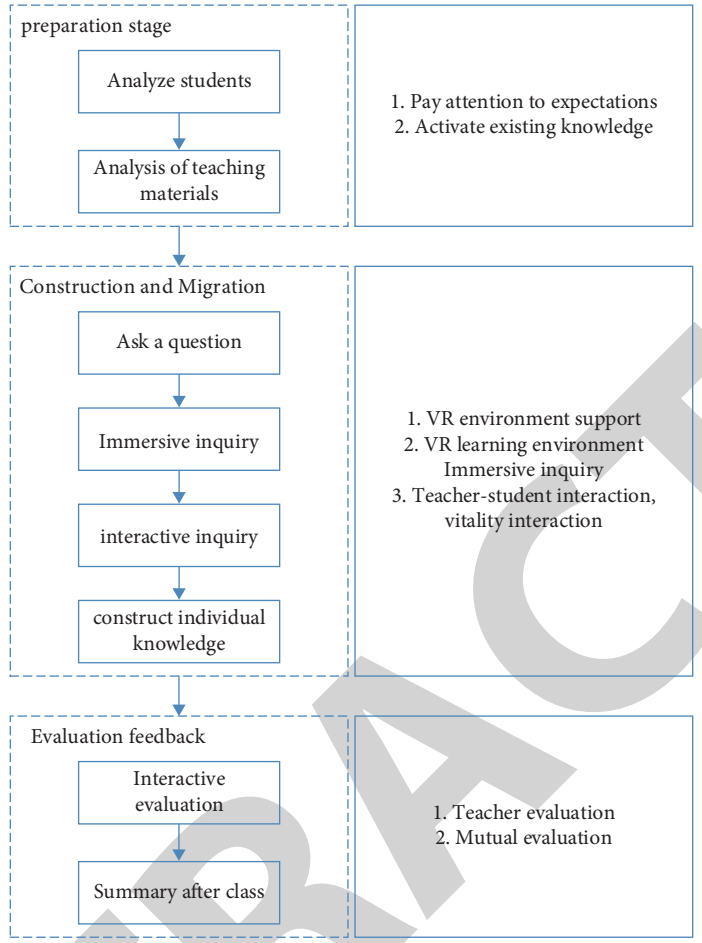

Figure 3: Deep learning model based on virtual reality environment.

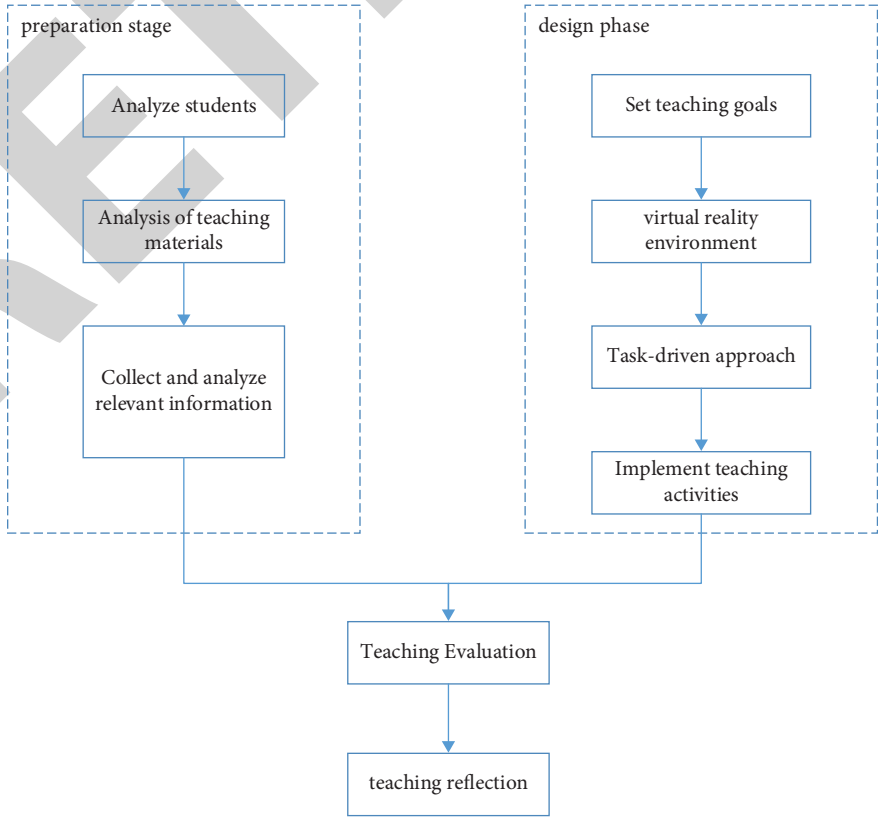

Figure 4: Instructional design framework.

Table 1: English teaching objectives.

Teaching objectives	1. Knowledge and skills: understand the meaning and usage rules of indefinite pronouns, learn to use Where and How to ask questions in English activity conversations, and learn to use Did to ask questions about what happened in the past. Master the following words: wonderful, most, something, nothing, of course, everyone, myself, yourself, anyone, anywhere. Master the following sentence patterns: a. Where did you go on vacation?—I went to the mountains. *b*. Where did Tina go on vacation?—he went to the beach. *c*. Did you go with anyone?—Yes, I did./No, I didn't. 2. Process and method: the teacher's demonstration and the VR educational game explain the use of the context in the simple past tense. Conduct group inquiry learning to complete the contextual use of the simple past tense in VR educational games. Use special interrogative sentences in the simple past tense, general interrogative sentences, and their affirmative and negative answers. 3. Emotional attitudes and values: feel the convenience of past tense in English expression, and improve the ability to use information technology to solve problems in real contexts. In the process of learning with VR educational games, cultivate a rigorous and realistic learning attitude.
Difficulties in teaching	Past tense in the correct context, the use of reflexive pronouns such as yourself, myself, and the use of the indefinite pronoun something, anything, someone, anyone, and other words.

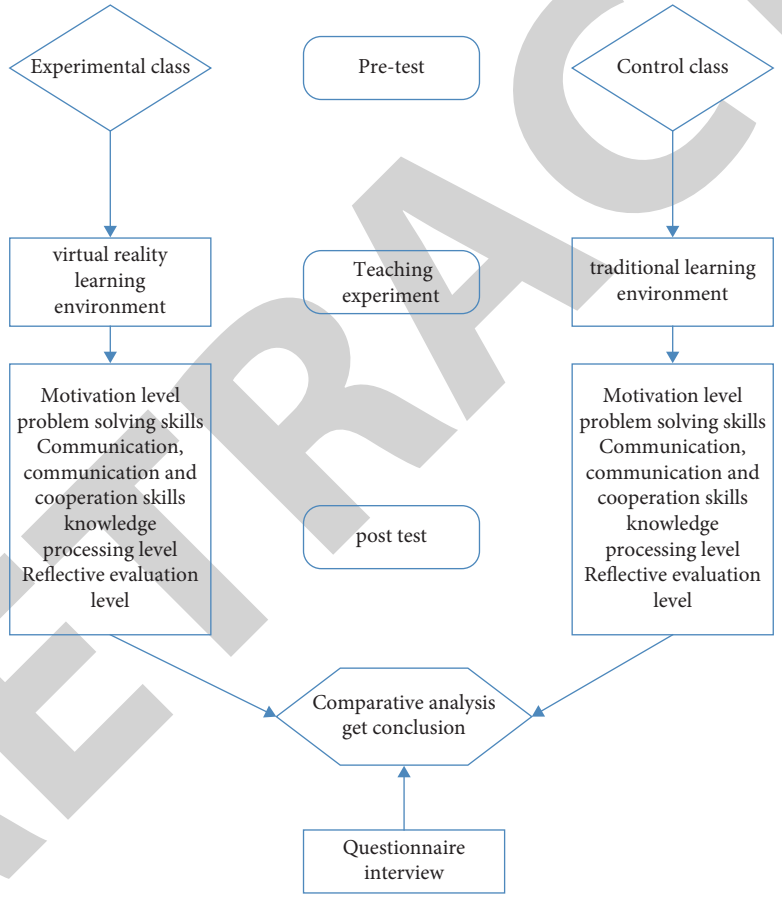

Figure 5: Experimental process design.

independent inquiry and cooperative inquiry. High school B sets up the VR teaching equipment in an independent VR classroom. As shown in Figure 6, the desks of the students in this classroom are set in rectangles, and the teachers have no other educational information equipment except VR equipment.

VR Science Corner is the first VR Science Corner in China that truly combines VR technology with science education. It aims at popular science knowledge points; uses virtual reality technology and virtual reality equipment; is based on high-quality VR science resources; breaks the traditional form of science education courses. Time provides immersive science knowledge learning and experience in order to realize various personalized teaching methods such as independent learning and inquiry-based learning, and enhance students' interest in learning. As shown in Figure 7.

However, each VR classroom is equipped with only one VR all-in-one machine, which is difficult for classroom teaching. Therefore, in the English classroom, another VR equipment for English classroom teaching is set up. VR/AR education brand Class VR product, its initial interface is shown in Figure 8.

Figure 6: VR classroom.

Figure 7: Placement of VR all-in-one.

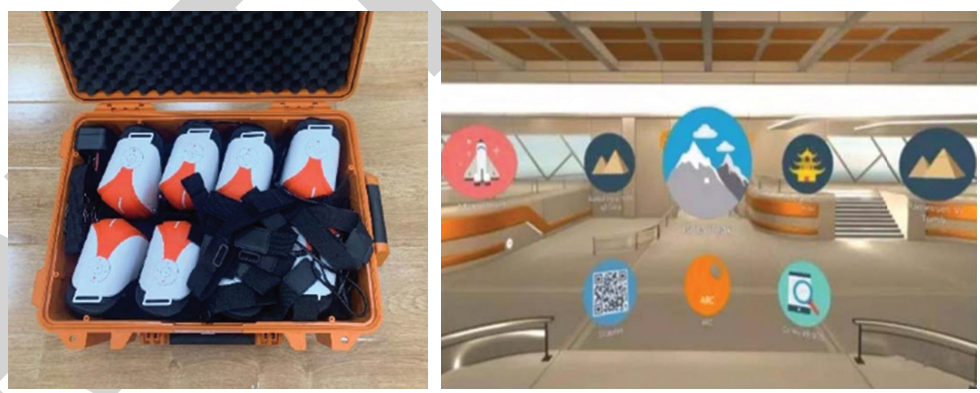

Figure 8: Class VR and initial interface.

4.3. Teaching Objective Design. To promote deep learning of English education blended teaching. Through the implementation of a virtual reality-based teaching model designed to promote deep learning in English education blended teaching courses, through quasi-experimental research, to explore whether the virtual reality learning environment can help promote students' deep learning.

4.3.1. Design of Teaching Activities. Teaching activities to promote students' in-depth learning means that students, under the guidance of teachers, carry out constructive activities based on existing knowledge, solve problems in different situations through experiments, analysis, summarization, etc., and finally form higher order thinking and complete shallow learning. The design of activities to promote deep learning mainly includes the form of activities, the selection of teaching resources, and the methods of implementing activities. These designs need to be closely combined with the in-depth learning objectives determined in the design of teaching objectives, especially the activities necessary for driving questions and content questions determined according to the objectives, to ensure the development of students' core literacy of English subjects and the

construction of self-knowledge systems, so as to promote high-level learning. The formation of order thinking.

At present, students' lack of initiative in learning English and lack of enthusiasm for learning are actually related to the current "dead" classroom. How to make the classroom really live, it is definitely necessary to design a variety of activities. The rational use of VR teaching resources is the key to changing this situation. Therefore, important activities that require teacher guidance should be given sufficient time for students to prepare in the classroom, and secondary students or activities that students are expected to be capable of should be completed after class. The purpose of deep learning includes the acquisition of disciplinary thinking methods, the cultivation of higher order thinking, etc., all of which require students to truly carry out activities independently, which cannot be achieved by teachers' elaboration alone. Of course, to ensure the quality of the activity, it is necessary to integrate various factors, such as whether the activity design is in line with the goals of deep learning; whether the students are given enough time; whether the students have enough opportunities to experience; the activity design of each link; and whether it is organically combined and matched with the purpose. Therefore, the teaching mode in this study requires teachers to design a study guide program for students to use in the course content in the teaching process. The purpose is to gradually guide students to achieve in-depth learning in the stages of autonomous exploration of VR experience and group discussion and cooperative exploration. Make students enter the virtual environment with questions to explore, and take part in group discussion and exploration with tasks.

4.3.2. Teaching Evaluation Design. In fact, most learners cannot complete deep learning the first time, and most people can only complete simple learning, that is, the "knowledge" level. The completion of deep learning requires continuous evaluation and feedback. It can be said that without evaluation and feedback mechanisms, it is almost impossible for learners to learn abstract and complex cognitive skills. Many studies have shown that evaluation can promote the improvement of course performance, promote learners to consolidate and internalize information, and is conducive to the path to understanding, comprehension, synthesis, evaluation, higher order thinking, and deep learning. Provide continuous evaluation to students so that as students engage in learning activities, they can continue to see, hear, and experience the results of their efforts.

4.4. Experimental Results and Analysis. By randomly distributing questionnaires to other students, the purpose is to ensure the rigor and rationality of the questionnaires, and the reliability and validity of the recovered effective questionnaires are tested using SPSS 23.0. This questionnaire sets the current situation of students' deep learning into four dimensions: motivation dimension, investment dimension, strategy dimension, and outcome dimension, which are mainly reflected in the level of reflection and evaluation, knowledge processing level, active cooperation ability, communication ability, problem-solving ability, and motivation. Basic information such as level mainly includes the following types of questions and the details are given in Tables 2 and 3.

4.4.1. Questionnaire Reliability and Validity Analysis. The Cronbach's alpha coefficient of the posttest questionnaire dimension is 0.929, which is greater than 0.8, indicating that this questionnaire has very high consistency and the design content of this questionnaire is reasonable.

The KMO value of the posttest questionnaire is 0.717, which is greater than 0.6, indicating that the questionnaire has good validity and is suitable for exploratory primer analysis; the significance of Bartlett's spherical test value is less than 0.05, reaching a significant level, indicating that the questionnaire contains items suitable for performing factor analysis.

4.4.2. Group Statistics

(1) Dimensional analysis. From the analysis in Table 4, we can see that from the perspective of motivation, the averages of the experimental class and the control class are 4.8308 and 4.2923, respectively, with a difference of 0.5385; from the perspective of investment, the averages of the experimental class and the control class are 4.7322 and 4.1994, respectively, with a difference of 0.5385. 0.5328; from the perspective of the strategy dimension, the averages of the experimental class and the control class are 4.7590 and 4.3949, respectively, with a difference of 0.3641; from the perspective of the result dimension, the averages of the experimental class and the control class are 4.7885 and 4.3590, respectively, with a difference of 0.4295; thus it can be seen that the mean value of each dimension of the experimental class is greater than the mean value of each dimension of the control class.

(2) Ability level analysis. From the analysis in Table 5, it can be seen that from the perspective of motivation level, the mean of the experimental class is 4.8376, and the mean of the control class is 4.8376.

The average value of the experimental class is 4.2735, a difference of 0.5641; from the perspective of problem-solving ability, the average value of the experimental class is 4.7650, and the average value of the control class is 4.4017, a difference of 0.3633; from the perspective of communication, communication, and cooperation ability, the average value of the experimental class is 4.7564, and the average value of the control class is 4.7564. The average value of the experimental class is 4.3419, a difference of 0.4145; from the perspective of knowledge processing level, the average value of the experimental class is 4.7607, and the average value of the control class is 4.2393, a difference of 0.5214; from the perspective of reflection evaluation level, the average value of the experimental class is 4.7404, and the average value of the control class is 4.7404. It is 4.3173, with a difference of 0.4231; it can be seen that the mean value of each dimension

Table 2: The distribution of deep learning according to dimension question type.

Dimension	Number of questions	Question number
Motivation dimension	5	Q3, Q4, Q5, Q6, Q7
Input dimension	9	Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q15, Q16
Policy dimension	10	Q17, Q18, Q19, Q20, Q21, Q22, Q23, Q24, Q25, Q26
Outcome dimension	8	Q27, Q28, Q29, Q30, Q31, Q32, Q33, Q34

Table 3: Deep learning questionnaire distribution of question types according to ability levels.

Ability level	Number of questions	Question number
Motivation level	6	Q3, Q5, Q6, Q7, Q15, Q18
Problem-solving skills	6	Q4, Q12, Q17, Q20, Q23, Q30,
Communication, communication, and cooperation skills	6	Q11, Q13, Q14, Q19, Q31, Q32
Knowledge processing level	6	Q8, Q9, Q10, Q16, Q21, Q33
Reflective evaluation level	8	Q22, Q24, Q25, Q26, Q27, Q28, Q29, Q34

Table 4: Posttest four-dimension group statistics.

	Class	N	Average value	Standard deviation	Standard error mean
Motivation dimension	Experimental class	39	4.8308	0.24078	0.03856
	Control class	39	4.2923	0.38620	0.06184
Input dimension	Experimental class	39	4.7322	0.31086	0.04978
	Control class	39	4.1994	0.40879	0.06546
Policy dimension	Experimental class	39	4.7590	0.36398	0.05828
	Control class	39	4.3949	0.40194	0.06436
Outcome dimension	Experimental class	39	4.7885	0.33339	0.05338
	Control class	39	4.3590	0.41575	0.06657

Table 5: Posttest five ability level group statistics.

	Class	N	Average value	Standard deviation	Standard error mean
Motivation level	Experimental class	39	4.8376	0.26070	0.04175
	Control class	39	4.2735	0.34937	0.05594
Problem-solving skills	Experimental class	39	4.7650	0.30038	0.04810
	Control class	39	4.4017	0.41836	0.06699
Communication, communication, and cooperation skills	Experimental class	39	4.7564	0.32183	0.05153
	Control class	39	4.3419	0.35858	0.05742
Knowledge processing level	Experimental class	39	4.7607	0.31250	0.05004
	Control class	39	4.2393	0.46641	0.07469
Reflective evaluation level	Experimental class	39	4.7404	0.39982	0.06402
	Control class	39	4.3173	0.44040	0.07052

of the experimental class is greater than the mean value of each dimension of the control class.

(3) Independent sample t-test. An independent sample t-test was performed on the data of the survey results using SPSS data statistical analysis software. The analysis of the results is carried out from four dimensions (motivation dimension, investment dimension, strategy dimension, and outcome dimension). From Table 6, we can see that the independent sample t-test results of the motivation dimension of the experimental class and the control class show that there are significant differences between the two teaching environments ($t = 7.389$, $p < 0.001$), the motivation dimension of students based on virtual reality learning environment is significantly higher than that of students based on traditional teaching form; the independent sample t-test results of the input dimension of experimental class and control class show that the two teaching environments exist significant difference ($t = 6.479$, $p < 0.001$), students based on virtual reality learning environment have significantly higher input dimension than students based on traditional teaching form; independent sample t-test results of strategy dimension of experimental class and control class show that the two. There is a significant difference in the teaching environment ($t = 4.193$, $p < 0.001$), and the students' strategy dimension based on the virtual reality learning environment are significantly higher than that of the students based on the traditional teaching form; the independent sample t-test results of the experimental class and the control class's outcome dimension. It shows that there is a significant difference between the two teaching environments ($t = 5.033$,

Table 6: Sample t-test in four dimensions of posttest.

	t	Degrees of freedom	Significance (two-tailed)	Mean difference	Standard error
Motivation dimension	7.389	63.664	p	0.53846	0.07288
Input dimension	6.479	76	p	0.53276	0.08223
Policy dimension	4.193	76	p	0.36410	0.08683
Outcome dimension	5.033	76	p	0.42949	0.08683

Table 7: Independent sample t-test for posttesting five ability levels.

	t	Degrees of freedom	Significance (two-tailed)	Mean difference	Standard error
Motivation level	8.081	70.303	p	0.56410	0.06980
Problem-solving skills	4.405	68.954	p	0.36325	0.08247
Communication, communication, and cooperation skills	5.373	76	p	0.41453	0.07715
Knowledge processing level	5.799	66.395	p	0.52137	0.08990
Reflective evaluation level	4.442	76	p	0.42308	0.09525

$p < 0.001$), and the outcome dimension of students based on the virtual reality learning environment is significantly higher than that of students based on the traditional teaching form. The experimental results show that there are significant differences in the four dimensions of the experimental class and the control class, and the experimental class is significantly higher than the control class in the four dimensions of motivation, investment, strategy, and results.

Use SPSS data statistical analysis software to conduct an independent sample t-test on the data of the survey results. From the analysis in Table 7, it can be seen that the independent sample t-test results of the motivation level of the experimental class and the control class show that there are significant differences between the two teaching environments ($t = 8.081$, $p < 0.001$), the motivation level of students based on virtual reality learning environment is significantly higher than that of students based on traditional teaching form; the independent sample t-test results of the problem-solving ability of experimental class and control class show that there are significant differences between the two teaching environments ($t = 4.405$, $p < 0.001$), the problem-solving ability of the students based on the virtual reality learning environment was significantly higher than that of the students based on the traditional teaching form; There is a significant difference between the two teaching environments ($t = 5.373$, $p < 0.001$). The students' communication, communication, and cooperation abilities based on the virtual reality learning environment are significantly higher than those based on the traditional teaching form. The independent sample t-test results show that there is a significant difference between the two teaching environments ($t = 5.799$, $p < 0.001$), and the knowledge processing level of students based on the virtual reality learning environment is significantly higher than that of students based on traditional teaching form. The independent sample t-test results of the reflective evaluation level showed that there was a significant difference between the two teaching environments ($t = 4.442$, $p < 0.001$), and the reflective evaluation level of students based on the virtual reality learning environment was significantly higher than that of students based on traditional teaching form.

5. Conclusion

In the information society, the progress of science and technology is reflected in all aspects, and high technology and new technology are constantly integrated into us.

The integration of modern technology into education and teaching can better improve the quality of teaching. As a modern technology, virtual reality technology, its interactive and immersive characteristics can make users feel immersive and inject into education. New vitality, the combination of virtual reality technology and education will create a different spark, which will also help deep learning.

In this study, the teaching application of virtual reality, the research level of deep learning and the two learning theory, embodied cognitive learning theory, and situational cognitive learning theory, an instructional design based on virtual reality to promote students' deep learning is constructed and applied in the actual English class, observe students' performance through teaching experiments, collect questionnaires and analyze data by distributing questionnaires after teaching is completed, and find that the learning environment based on virtual lines is conducive to the improvement of students' in-depth learning, whether it is classroom discipline or group discussion, The overall engagement of the students in the experimental class is significantly higher than that of the students in the control class. Based on the analysis results of the four dimensions of motivation, engagement, strategy, and outcome of the deep learning questionnaire, the experimental class has a higher level of engagement in each dimension. The performance level is higher than that of the control class, which provides a new idea for promoting the deep learning of English courses.

Virtual reality provides a new teaching environment for teaching. Virtual reality technology needs to be skillfully combined with the teaching mode, which subverts the traditional teaching environment and provides a more effective way for the realization of deep learning. Due to the limitations of the research, this research is only at the initial stage of related research, and future research can add experimental measurement methods, collect, and use a variety of data, such as comprehensive analysis through eye trackers,

EEG research, etc., to deeply explore whether students enter the flow state and achieve deep learning.

Data Availability

The dataset can be accessed upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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