Virtual Reality-based Internet + Smart Classroom

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Abstract

With the deep development of Internet +, it is necessary to actively explore the deep integration of Internet + and classroom teaching and build a smart classroom, especially in the courses that require thinking training. The urgency is mainly reflected in three aspects: First, the trend of the times; Second, the inevitable requirement of education reform; and third, the urgent need for practical teaching. This paper shows that VR-based experiments are effective through teaching experiments on fast sorting algorithms difficult for junior high school students to understand in information courses. According to the experimental results, firstly, students who used VR teaching to assist applied learning had better academic performance than students who used traditional teaching methods. Second, students who learn using VR teaching-assisted applications present better learning attitudes than students who use conventional teaching methods. Third, the cognitive load of students using virtual reality teaching aids is lower than that of traditional teaching methods.

Keywords: Smart classroom, Virtual reality, Quick sort, Internet +

1 Introduction

With the rapid development of science and technology, people's reading and watching habits are constantly changing, and the way of digital and visual information dissemination gradually occupies a dominant position, which marks the arrival of the visual culture era. In recent years, a variety of teaching and educational methods have emerged one after another, and virtual reality technology has begun to enter the field of education and teaching. Virtual reality technology came into being at the end of the 20th century, developed into a complete scientific system, and gradually accepted by the public.

The “internet plus” continues to be promoted in many fields such as medical care, old-age care, education, culture, sports and so on. It has gradually penetrated into all aspects of social life and played an increasingly important role in promoting the rapid social development and improving people's quality of life. With the advent of the Internet age, the influence of the Internet on education is becoming more and more profound. While expanding the extension of education in time and space and providing a new carrier for education equity, the Internet is also changing the traditional teaching and learning model that has been used for thousands of years, creating a new “three-foot platform”, making “Internet+education” a major trend. The “internet+education” becomes a trend.

The concept of intelligent classroom originated from educational informationization, which was introduced in the United States in the 1990s with the construction of the information superhighway. The intelligent classroom is a smart classroom that assures the growth of technology used to enhance teaching and learning methodologies in the classroom for the development of students. In the “information superhighway” plan of the United States, the application of information technology in education is mainly considered as an important way of educational reform in the 21st century. In China, with the rapid popularization of network technology, colleges and universities have taken the lead in joining the Internet since the end of 1990s, and since 2000, the relationship between the development of the whole society and information technology has become increasingly close. People are paying more and more attention to the influence of information technology on social development, which is linked to the reform and development of university education. In recent years, colleges and universities began various attempts to promote teaching methods and means such as catechism actively, flipping classroom, micro-course and blended teaching, hoping that colleges and universities could be more intelligent and efficient.

With the continuous progress of the times, it has become an inevitable trend for virtual reality technology to enter the traditional classroom. Virtual reality is an emerging technology that will take the educational system to the next level of technological advancement. This will also allow students to study more easily and store their learning materials in a digital file. As a result, visual learning will be beneficial to students of the future generation. It will also help to build the ability to think creatively. I hope this study can find out the problems, sum up the rules, and provide practical teaching experience for future “internet plus” and “Virtual Reality+” education, and provide some reference opinions for future art education.

2 Related Work

The development of Internet technology offers more possibilities for innovation in various industries, and online media has become an important medium for information and knowledge dissemination. Teaching is no longer about students being satisfied with the transmission and

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indoctrination of teachers, but about generating empathy between teachers and students in the classroom. In this context, it is obvious that the traditional indoctrination teaching model no longer meets the needs of teaching, and it has a limiting effect on stimulating learners' innovation and knowledge transfer application ability. The emergence of a series of "smart models" such as smart campus, smart classroom and smart classroom has presented new opportunities and challenges to the development of university education, among which the smart classroom is a new teaching model that implements digitalization and personalization in the whole teaching process, providing new ideas to realize deep learning of learners. By integrating intelligent data analysis, information sharing, and technology application with the whole teaching process, teaching quality is improved. With the emergence and development of rain classrooms, online learning spaces, and microlearning resources, the teaching model has shifted from "teaching-oriented" to "learning-oriented" [1]. In recent years, scholars in the field of education have been practicing various teaching models in order to realize deep learning of learners. Deep learning is a subset of AI and machine learning techniques. It is used to process datasets and includes student results for improving academic material and tackling challenging issues. In the development of education informatization, the application of teaching tools and information technology to improve teaching is the inevitable trend of education development. Smart classroom is more in line with the requirements of the times, applying smart teaching tools to better integrate teaching contents and teaching methods with the classroom and cultivate the higher-order thinking ability of education masters. Smart classroom as a new teaching mode provides a new way of inquiry for realizing deep learning.

The early integration of virtual reality technology with the field of education and education was mainly focused on the applications of virtual laboratory, virtual teaching and distance education. Virtual reality technology was first born in the United States, and the United States is also one of the most advanced countries in virtual reality technology, with the highest level of development of virtual reality technology in the world, and is also the first country to apply virtual reality technology in the field of teaching and education. Subsequently, with the development of virtual reality technology, many countries and research institutions also began to gradually use virtual reality technology in education and teaching.

With the popularity of the Internet and the deepening of Internet thinking, universities are using the Internet more and more frequently and in a wider range in teaching. More and more teachers try to use the Internet to make their classrooms intelligent and wise, and the construction of smart classrooms becomes more and more common. Especially for the sudden outbreak of the epidemic in the spring of 2020, most universities in various countries have launched online courses, some of which are very well developed catechisms through long-term construction, and some teachers are applying online education platforms for the first time. In the future, for the need of epidemic prevention and control, the development of online courses will also continue for a long time and in various forms. In March 2021, the Ministry of Education put forward a notice on strengthening informationization of education management, which provides strong support for the construction of smart classrooms in colleges and universities. However, the construction of smart classroom does not happen overnight. Smart classroom is different from traditional classroom in the form of classes, and Salman believes that education is not only an art, but it also has scientific rigor. Therefore, the teaching design, implementation and evaluation of the smart classroom are particularly important. According to Liu Bangqi, "smart classroom" is an intelligent and efficient classroom based on constructivist theory, using "Internet +" thinking and new generation information technology such as Internet of Things, big data and cloud computing to support the whole process of application before, during and after class. Constructive theory is a learning theory mechanism that focuses students' knowledge through self-guided review and identifies the intermediary skills to acquire their knowledge depending on the requirements. classroom [1]. The author believes that the smart classroom is a new teaching method that relies on the Internet, uses new information technology and tools, and runs through the whole classroom teaching, and through the education of the smart classroom hopes that students gain more wisdom and knowledge in an efficient classroom.

2.1 Smart Classroom and Virtual Reality

The Smart Classroom enhances student participation through teacher guidance, with the goal of stimulating innovative thinking and focusing on student sustainability. Personalized learning is also referred as student-centered learning since it requires students to study independently and to meet their educational goals. In addition, the individualized learning methodology tracks the students' mistakes and learning weaknesses [10].

The aim is to stimulate students' innovative thinking and focus on students' sustainable development. Based on the original types of teaching models, four types of smart classroom teaching models are summarized.

Smart Classroom Personalized Teaching Model

Smart classroom personalized teaching model has five basic links: (1) personalized learning analysis and pre-school self-assessment; (2) personalized learning resources and services; (3) personalized learning activities; (4) personalized consolidation and expansion; and (5) multiple developmental assessments.

Smart Classroom Inquiry Teaching Mode

The inquiry teaching mode supported by the smart classroom environment includes: (1) creating a situation and asking questions; (2) making full conjectures and establishing hypotheses; (3) designing solutions and exploring practice; (4) analyzing data and drawing conclusions; and (5) evaluating and reflecting and communicating.

Smart Classroom Hybrid Teaching Mode

Smart classroom hybrid teaching integrates two different types of activities, online and offline, in different teaching sessions. Online, teachers push out online resources, organize online activities, and guide students to use online resources for independent learning. Offline, the teacher provides the key points of knowledge and organizes interactive discussions to further internalize the knowledge.

Smart Classroom Generation Teaching Mode

With diversified technical support, the generative teaching model of smart classroom consists of five stages: (1) pushing out pre-class learning resources; (2) creating teaching situations and guiding students to ask questions; (3)

monitoring students' learning in real time; (4) providing cognitive tools and display platforms; and (5) organizing students to conduct multiple assessments.

As a technology that sprouted, developed and matured abroad, some countries in Europe and the United States planned to introduce virtual reality technology into the field of education science at an earlier time, and many foreign studies focused on technical issues, and also partly on the discussion of combining virtual reality with education. Some famous 3D interactive software companies such as Oculus Rift have also taken the lead to focus their attention on the development of virtual reality educational service platform research, and introduce 3D technology into classroom teaching applications, so that it is no longer only a research object in the field of scientific research work [7]. More than 150 colleges and universities in the United States have built virtual environments for abstract content teaching and research based on the Second Life social platform, and about 80% of colleges and universities in the United Kingdom have expressed [8]. In the early 1990s, virtual reality was introduced into research and teaching programs in K-12 and higher education in a variety of disciplines [9]. Alhalabi Wadee conducted an experiment with the use of model design as the independent variable and concluded that VR learning environments can foster creativity and impact [11]. Arizona State University has developed the Situated Multimedia Arts Learning Lab (SMALLab) to design learning environments for elementary and secondary schools, and research has shown that SMALLab is effective in promoting student learning and improving teacher instruction [6]. In conclusion, virtual reality is ideal for teaching abstract concepts due to its visualization features, and it has an important role in fostering creativity and improving thinking skills. Fostering creative thinking is the ability to come up with and create innovative solutions in order to generate state-of-the-art work and address issues in novel ways. It is also accomplished through promoting students' uniqueness and providing a stimulating environment in smart education [11].

2.2 Status of Programming Education

In 2011, the U.S. "K-12 Standards" mentioned that students should acquire problem-solving skills through computer learning, i.e., have a computational mindset to solve problems [12]. "The CSTAK-12 Computer Science Standards", completed in 2016 with the participation of relevant experts from across the United States, meant that computer science was officially adopted as an elementary and secondary school subject in the United States [5], and in the same year, Indiana included "Programming and Algorithms". In 2013, the UK authorities promoted programming education for students to learn to use computational thinking to understand problems, thus "teaching programming" was formally introduced into primary and secondary schools. In 2014, "computer literacy" was added as a teaching objective, and programming knowledge was incorporated into textbooks, which was called the "Year of Programming" [4]. In the context of the "explosive" growth of programming education, many representative programming education platforms for youth have emerged, and in 2017, HuffPost, a famous American news website, published and introduced programming education products for children of different ages, and in 2018, Apex Striving Data has also released a number of educational resources. Australia combines programming education with other disciplines and aims to develop students' computational thinking [2]. Researchers from the National University of Distance Education in Spain have followed 107 students in five elementary school for two years and found that students' motivation and enthusiasm for learning with visual programming [3]. In conclusion, since 2012, countries such as the United States and the United Kingdom have been incorporating programming into their primary and secondary school curricula one after another [13-14]. It is clear from the importance attached to programming education abroad that programming education cannot be delayed.

3 Advertising Space Optimization Algorithm based on Reinforcement Learning and Game Theory

3.1 Quick Sort Algorithm

Sorting algorithm is an important content of programming reflecting computational thinking, and it is a key and difficult point of teaching in the IT curriculum. Quick sort algorithm is the fastest algorithm model covered in the paper. It divides and conquers the arrays to sort them. Swapping items in place and splitting a segment of the array are the two operations in the algorithm [15]. The concept of variables, the relationship of variable values, and the abstract characteristics of the algorithm itself make it difficult for junior high school students to learn to master it. For junior high school students who lack logical thinking, it is more difficult to master the knowledge of quick sorting algorithm and debug the code on the computer. Some students are relatively strong in logic and can easily learn this part of knowledge, but those who are weak in logic have some difficulty in accepting it. In this paper, we design a teaching aid application for fast sorting algorithm based on VR technology to visualize the knowledge of fast sorting algorithm, so that students can learn to understand, intuitively understand the relationship of variables and the exchange of variable values, thus reducing the cognitive load of students in the organization of learning materials and improving learning motivation and learning efficiency. The cognitive load scale measures how much information working memory can handle at any one time. There are three forms of cognitive load: Intrinsic cognitive load, Extraneous cognitive load, and Germane cognitive load [16]. The pseudo-code for understanding the traditional quick sorting algorithm is shown below.

```
void ThrQSort(Sqlist &L,int low,int high){
int originLow = low， originHigh = high;
int i = low， j = high， current;
int middle1 = L.r[low]， middle2 =
L.r[high];
if(middle＞middle2)
swap(middle1,middle2) ;
while(L.r[i]＜= middle1) i++;
while(L.r[j]＞middle2) j--;
current = i;
while( current＜= j)
{
```

```
if(L.r[current]<= middle1)
swap(L.r[current++], L.r[i++]) ;
else if(L.r[current]> middle2)
swap(L.r[current], L.r[j--]) ;
else current ++;
}
throqsort (L,originLow, i -1);
ThrQSort(L,i,current -1);
ThrQSort (L,current,originHigh);
}
```

3.2 Instructional Application Design and Development

In this study, VR goggles, the most basic virtual reality device, are used to visualize the sequencing process of abstract algorithmic knowledge and to use new teaching tools in the classroom to attract students' attention, improve classroom participation, and deepen their understanding and mastery of the learning content. The development of the application does not require special teaching equipment to support it, and it has some realistic value for regular teaching.

Unity 2017.1 software was used to build the virtual environment, which is now a mainstream VR development tool and a comprehensive software platform for 3D games and 3D animations, and can provide users with a realistic 3D space by setting the perspective, lighting, objects, and cameras through the functions displayed in the main interface. One of the software packages used to support the virtual reality platform is Unity 2017.1. The software allows users to participate in interactive simulations. It's also used to make 3D and 2D games [17]. In this paper, we introduce VR technology into junior high school teaching, transition from traditional boring teaching methods to emerging 3D technology teaching methods, design 3D teaching resources, enhance the effectiveness and interest of classroom teaching, thus stimulating students' curiosity about emerging technologies, expanding traditional educational knowledge, and enriching junior high school students' science and technology culture. Unity is a comprehensive game development platform, and its free materials provide learners a great convenience. For most teachers in schools, it is easy to get started and convenient to use, and has more advantages compared to other development platforms.

In the Quick Sorting Algorithm APP, you can see a scenario where there are 12 boxes and 12 balls on the ground, the boxes are considered as variables, the numbers on the boxes are the variable names and the balls are the variable values, the values of the variables can be exchanged and moved, while the names of the variables and variables are fixed and the memory capacity cannot be seen directly, so it is assumed that the balls cannot be seen in the static state, but the numbers on the balls, which are the size of the variable values, are known and the size of the variables can be compared and exchanged.

The overall picture chooses a combination of cold and warm colors, and the thesis refers to relevant literature to know that colors have a greater impact on human emotions and psychology, such as yellow can give people a lively and pleasant feeling, which helps to stimulate students' creative thinking; gray is calm, low-purity gray gives people a quiet feeling, which is convenient for students to stay awake and be able to think rationally and attentively; red can stimulate students' creativity. The ground adopts a dark green color design, which does not have an exciting visual impact on students. The following Figure 1 shows the Unity design interface, as shown in the figure, the square boxes represent variables, the model is designed in yellow, 12 boxes are arranged in the same size in an orderly manner, and the front of the boxes are labeled with a total of 12 numerical labels from 1-12. The small ball represents the variable value in orange-red color, which is the key observation object, so the color concentration is high to attract students' attention.

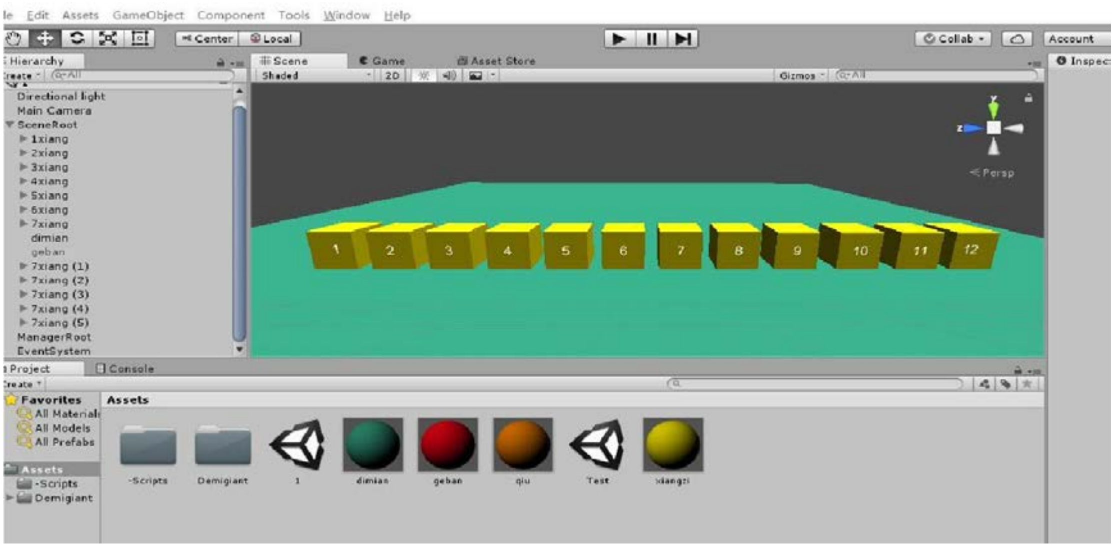


Figure 1. Box-variable model diagram

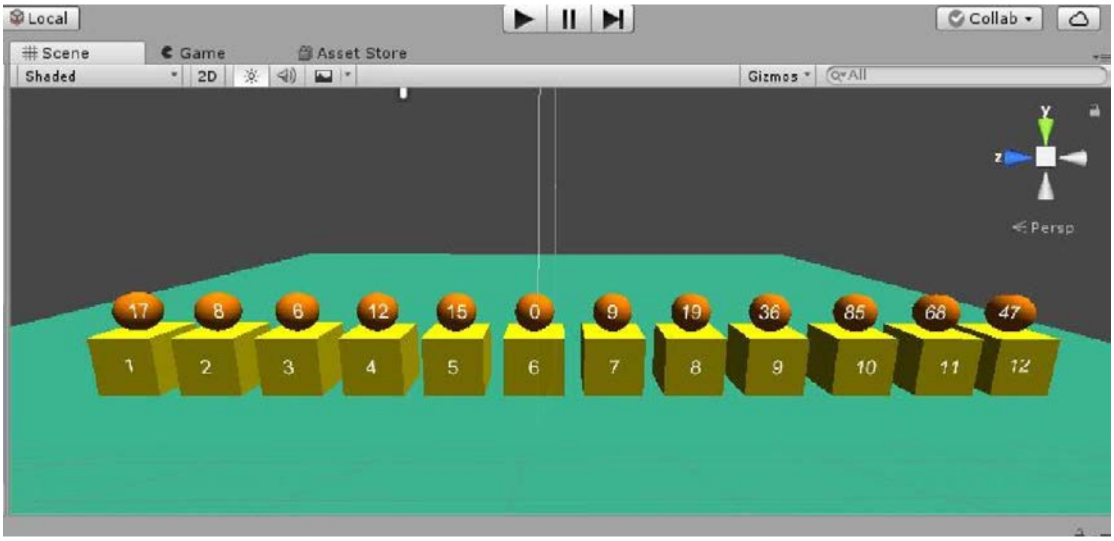


Figure 2. Sphere-variable value model diagram

The two compared balls both rise and translate at the same speed and displacement, and stop in the middle of the two balls. (Refer to Figure 2) The orange ball is compared with the yellow baseline ball to decide whether to swap or not, and the swap process is shown below. The movement of the balls is implemented through the Unity third-party plugin DoTween, which presents the exchange rules of the fast sorting algorithm. In addition, if the balls move too fast during the game, students with weaker logic will have difficulty learning the algorithm, because the fast ball swapping speed will dazzle them and make them unable to think, thus generating negative emotions of boredom. If the speed of the ball is too slow, they will develop slackness and complacency, which will hinder their progress. For these two extremes in the context designed three speed functions: fast, medium and low speed, students can switch the speed at will according to their cognitive situation and interact with the sorting game, which is also an innovative point of the 3D scene design. In addition, the game also adds two functions of restarting and exiting the game. Each time the game restarts running the values on the small ball in the scene will be displayed randomly from 1-100 (Refer to Figure 3).

Figure 3. Ball transformation process

The design of the VR teaching resources of the fast sorting algorithm closely fits the pedagogical theory and the psychological characteristics of students, and is designed to make students interested in the classroom and the learning content, fully understand the knowledge content of the fast sorting algorithm in the visual images, and be able to transfer the knowledge to use. Pedagogical theory is applied to explain teaching methods and impacts learners' psychological development. Only when students participate in the course, interact with the teaching materials, have a sense of participation will they have a sense of experience and thus have a better active cognition of knowledge, which will lead to meaningful learning. The use of VR teaching aids not only increases interest in learning and self-efficacy, actively constructs the knowledge structure and thus meaningful learning, but also stimulates creative consciousness, develops students' scientific literacy, and maintains the thirst for knowledge.

4 Dataset and Experimental Results

4.1 Experimental Protocol and Data

This experiment introduces VR technology into the middle school classroom and develops VR-based teaching aid applications to help students improve their learning and establish algorithmic thinking. The teaching aid applications do not require special teaching equipment in terms of platform design, direct human-computer interaction learning and triggering of relevant functional buttons, and are of realistic use for regular teaching.

The experimental subjects were local second-year students, divided into an experimental group (EG) and a control group (CG), each with 30 students. The two classrooms used IT teaching tools, the students in the experimental group were using VR teaching aids to learn, and the students in the control group were using traditional teaching methods to learn. The differences in students' learning performance, learning attitudes and cognitive load were explored by using different teaching methods in the experimental and control groups. It was ensured that extraneous variables such as pace, teacher and materials were kept consistent in both groups. (Refer to

Table 1 & Figure 4). Improved learning, skill development, and enhanced student and teacher engagement with the subject matter are all facilitated by 3D technology. It can promote collaboration, teamwork, planning, design, and the exploration of challenging or complicated subjects. 2D Teaching: Students' conventional learning techniques are believed to be the 2D teaching approach. It employs resources such as printed information, charts, graphs, posters, and maps. Textbooks, reference books, workbooks, and printed materials supplied by the teacher are examples of printed material. The organizational chart is more commonly used to classify certain materials, events, based on the group.

Table 1. Comparison of experimental students

Groups	N	Differences		Similarities
EG	30	VR teaching aid applications	VR 3-D Teaching	Same study materials Same instructor
CG	30	Traditional Technology Teaching	2D Teaching	Same teaching schedule

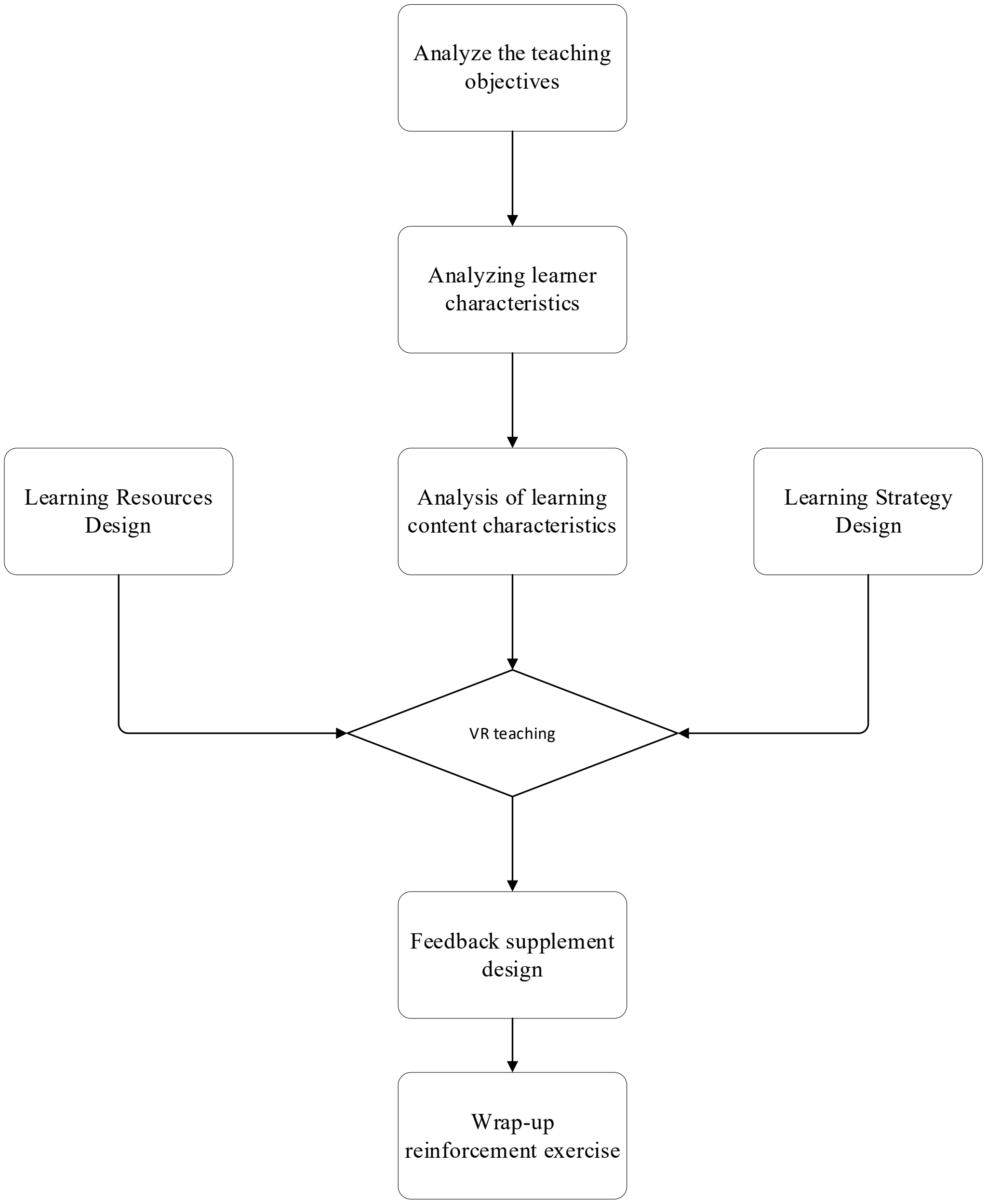


Figure 4. Instructional design flow chart

4.2 Pre-experimental Preparation and Procedure

The experiments were conducted in the experimental group using VR teaching aids to help students understand and master the fast sorting algorithm, so as to write and debug the program on the computer, while the control group used the same teaching sessions as the experimental group, and both the experimental and control groups were taught by the same teacher. Students showed great interest in the VR glasses during the teaching process, which not only increased their interest in this part of the learning program, but also cultivated their interest in science. Most of the students were active in the classroom, and the picture below (Figure 5) shows the students experiencing VR learning.

Figure 5. Students experience virtual reality smart teaching

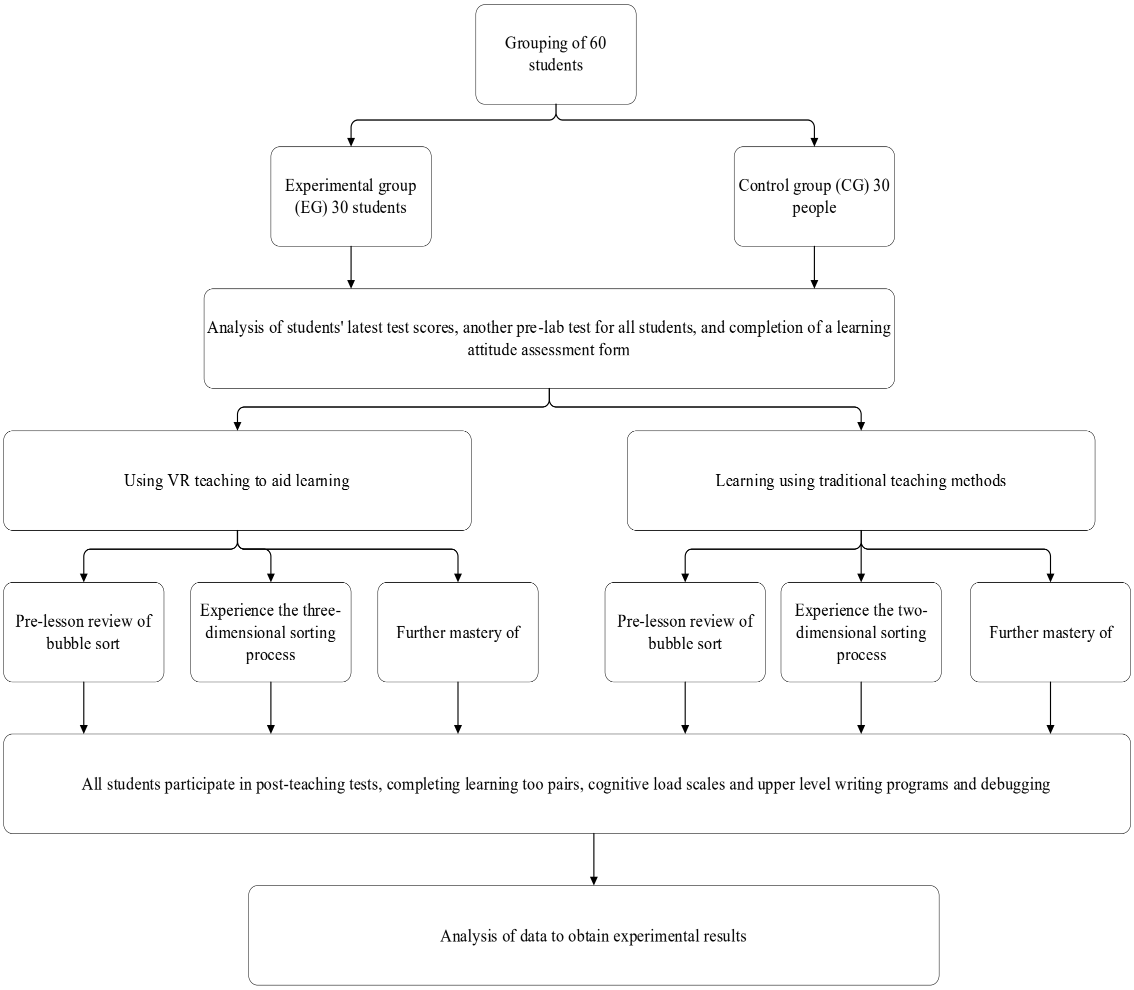


Figure 6. Experimental flow chart

Before the teaching experiment is conducted, we understand the current programming status of students, carefully study the content of textbooks and related tutorial materials, sort out relevant literature, and study various teaching designs and teaching methods so that the teaching can be carried out smoothly (Refer to Figure 6). The following diagram shows the flow arrangement for the smooth conduct of this experiment.

4.3 Experimental Results and Analysis

The assessment scales were tested in the classroom and collected in the classroom to ensure that every student participated in the scale assessment, and the recovery rate was 100%. The pre-experimental test ensured that the a priori knowledge of the experimental and control groups was at the same level, which ensured a fair grouping. In the classroom, the experimental group and the control group were taught by 3D and 2D teaching methods, respectively. The experimental results verified that, firstly, students who used VR teaching to assist their learning applications had better academic performance than those who used traditional teaching methods.

Second, students who used the VR teaching-assisted applications showed better learning attitudes than those who used traditional teaching methods. Third, students had lower cognitive load when using VR teaching aids compared to those using traditional teaching methods.

The data were divided into two parts, the pre-experimental data as well as the post-experimental data. The post-experimental test papers were marked by the same person, graded according to the awareness of variables and the results of the onboard operations, and Excel tables were made to analyze the assessment of the learning attitude scale, the cognitive load scale, and the test question test result numbers with independent t-tests using SPSS data analysis software. The experimental data analysis involved the functions of SPSS software such as reliability analysis, descriptive statistics, and independent t-test, etc. SPSS (Statistical Package for the Social Sciences) which is used for complex statistical data analysis. The usage of the algorithm is discussed in the revised manuscript. The collected data were organized and analyzed separately according to the rules of data software analysis, and the specific data analysis is as follows (Table 2 & Table 3).

Table 2. Independent sample t-test for pre-test scores

Groups	N	Mean (SD)	t	p
EG	30	63.17(12.728)	0.197	0.845
CG	30	62..60 (9.335)		

Table 3. Independent sample t-test of the pre-test learning attitude scale

Groups	N	Mean (SD)	t	p
EG	30	27.17(3.352)	0.439	0.662
CG	30	26.83(4.235)		

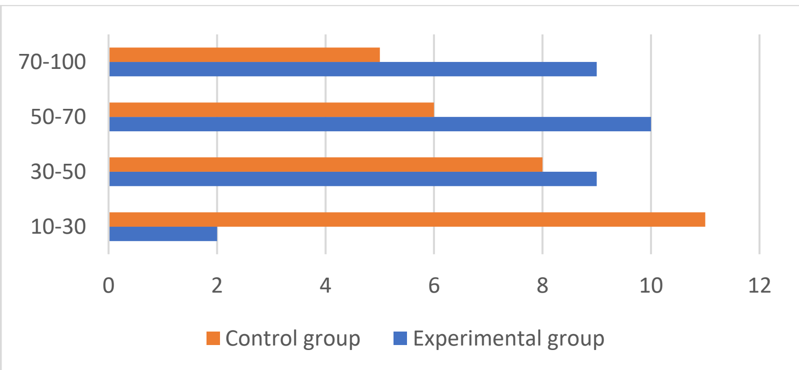
The data from the experimental post-test were divided into three parts, i.e., the quick sorting algorithm test question scores, the learning attitude assessment scale, and the cognitive load assessment scale, and the specific analysis of the data from the three parts is as follows.

The purpose of the post-test was to investigate the differences between the experimental and control groups in terms of teaching effectiveness, students' learning status, students' attitudes toward the teacher's instruction, and students' cognitive load. To ensure the discipline and validity of the test, students in both groups were tested in two examination rooms in the same class, each supervised by two teachers. In order to ensure the discipline and validity of the test, 30 test papers were issued to each group and students were required to complete the test within 30 minutes, and the test questions were copied to a USB disk by the teacher. The test results were significantly different, and the mean score of the experimental group (EG) was significantly higher than that of the control group (CG) (Refer to Table 4).

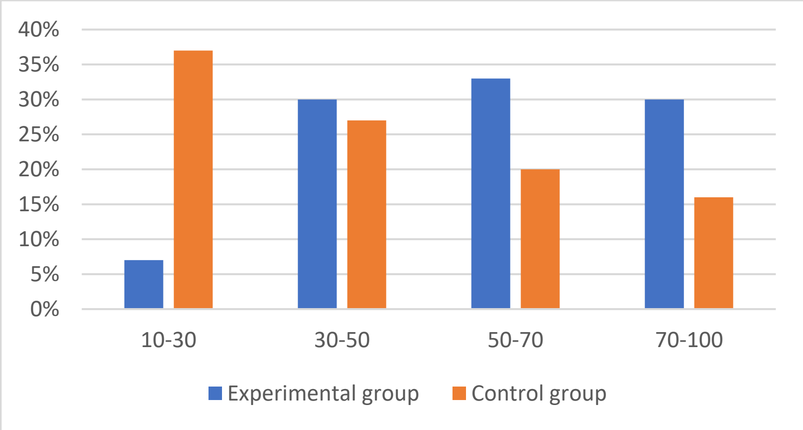
Table 4. Independent sample t-test of the pre-test learning attitude scale

Groups	N	Mean (SD)	t	p
EG	30	60.67(20.37)	3.425	0.001
CG	30	41.50(22.90)		

According to the statistical graphs of the post-experimental test scores of the students in the experimental and control groups, the number of students in the experimental group who scored 50-70 and 70-100 was significantly higher than that in the control group, while the number of students who scored 10-30 was significantly lower than that in the control group. This indicates that the students who learned with the VR teaching aid had better academic performance than those who learned with the traditional teaching method. This indicates that the use of VR teaching aids is more effective in teaching (Refer to Figure 7).



(a) Based on scores of students



(b) Based on percentage of students

Figure 7. Experimental group and control group students' post-experimental test score bands statistical chart

In order to detect students' attitudes toward the whole experimental process after the experiment, a learning attitude assessment scale (experimental group) and a learning attitude assessment scale (control group) were used to investigate students' attitudes toward the teaching content, the instructor's teaching session, and the use of teaching methods. The following table was tested and collected in the same classroom. The following Table 5 presents the results of the independent t-test for the experimental group and the control group (the higher the score of the assessment results, the better the learning attitude).

Table 5. Post-experimental measurement control group experimental group learning attitude independent t-test

Groups	N	Mean (SD)	t	p
EG	30	65.17(8.26)	4.076	0.00
CG	30	56.27(8.56)		

From the above table, the independent t-test results for the experimental and control groups t=4.076, p=0.000<0.05, this result is statistically significant i.e., the test results for the experimental and control groups are significantly different, which indicates that students learning with VR teaching aids present better learning attitudes compared to students learning with traditional teaching methods.

The third question explored in this experiment was whether students had a lower cognitive load when using VR teaching aids compared to traditional teaching methods. Because of the relative lack of programming thinking, middle school students have considerable difficulty in mastering abstract algorithms. Therefore, developing VR teaching aid applications that add graphical constructs allows students to reduce the excess energy expended in the task and learn better within the limits of what the individual can afford to learn. In the actual teaching process, educators should uphold the design principles of controlling the internal cognitive load, reducing the external cognitive load, and increasing the relevant cognitive load in the organization of classroom materials and the design of teaching methods, so as to reduce the cognitive load of students. The cognitive load assessment scale mentioned in Chapter 4 was used in the thesis, and each student participated in the scale by using the method of in-class testing and in-class retrieval, with a 100% retrieval rate. The data were analyzed using SPSS, a data analysis tool, and the results are shown in Table 5 (the higher the score, the higher the cognitive load). From the Table 6 below, t=3.459, p=0.001<0.05, this result is statistically significant, i.e., there is a significant difference between the cognitive load scale of the control group and the experimental group, which indicates that the students in the two groups have different cognitive load in the learning process, and the mean value of the experimental group is lower than the mean value of the control group, which means that the students in the experimental group can learn the new course with relative ease, i.e. The students had lower cognitive load when using VR teaching aid applications compared to using traditional teaching methods.

Table 6. Independent t-test for post-experimental measurement of cognitive load

Groups	N	Mean (SD)	t	p
EG	30	29.97(5.46)	3.459	0.001
CG	30	20.30 (7.13)		

5 Conclusion

The cultivation of computational thinking is of great value to the cultivation of innovative talents, especially for middle school students, who are gradually dominant in abstract logical thinking. It is an effective way to stimulate students' interest in learning to let students participate in classroom teaching. Combining the theoretical basis of pedagogy with the development of virtual reality teaching AIDS, teaching design and practice, and analyzing the experimental data, this paper draws the conclusion of exploring the problem.

VR technology is an important technical method and a medium in the Internet+ Smart Classroom, which is a supplement and extension of teaching methods, and its deep integration with education teaching is impacting traditional education teaching. However, not all teaching contents are suitable for VR teaching-assisted application teaching. Teachers should deeply analyze the teaching contents, select the contents suitable for virtual reality teaching, simplify and effectively teach the teaching contents to students, and reduce students' cognitive and psychological burden, which requires researchers' in-depth exploration and experiment.

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