Application and Teaching Exploration of Virtual Reality Technology in Art Appreciation

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Abstract-The combination of art class with VR (virtual reality) technology can realize the improvement of students' maximum subjective learning ability, and stimulate students' internal motivation to feel the pleasure and satisfaction of learning activities. At the same time, it can overcome the limitations of the teaching site, bring technical support for situational learning, visualize abstract problems in art teaching, and make theoretical thinking reliable. VR technology enriches art teaching content by enhancing the visualization and visualization of art works, and its authentic visual effect enables students to understand the three-dimensional dynamics and situational intention of sensory art works. It is not only a tool, but also an important carrier to inspire students to learn art initiative and explore art initiative. The application of VR technology in art teaching can avoid the shortcomings of traditional teaching, improve the quality and effectiveness of art education, and promote the development of education in the process of improving the effect and essence, which provides a new form for modern art teaching and realizes its qualitative leap.

Index Terms—Art teaching, VR technology, virtual scene

I. COMBINATION OF VR TECHNOLOGY AND EDUCATION

In the traditional teaching mode of fine arts, most teachers' demonstration is in kind or in the field of actual operation, which has serious drawbacks. For example, due to the different locations of students in the learning scene, the visual effects in the main eye of students studying in different locations are not the same. Even if the image is enlarged by the projector, it is still difficult to avoid such problems. On the other hand, students usually master relevant abilities through appreciation, teacher guidance and repeated imitation. Teachers' pause time in changing media often affects the fluency of teachers' teaching, which increases the difficulty of art teaching to some extent. At the same time, in the traditional art appreciation class, history theory is usually the main course, and the teaching process is generally implemented through the introduction of historical facts, explanation of concepts, appreciation of representative works and other links. Students cannot take the initiative to participate in the class to obtain corresponding knowledge and perception. Compared with the traditional

education mode, VR teaching has more obvious advantages [1]. It can effectively solve problems such as low enthusiasm of students and poor teaching effect. Both in terms of theoretical learning and practical operation, it has a great space for exploration and a vision of sustainable development. Through the combination of VR technology (Fig. 1) and art theory learning, it can overcome the limitations of the teaching site and provide technical support for situational learning. Students can get to know the world without leaving the classroom. At the same time, it reified abstract problems, made theoretical thinking more reliable, enriched classroom presentation methods, and stimulated students' internal motivation to have a sense of pleasure and satisfaction with art learning activities.

In daily art teaching, painting and art appreciation, as the main content of the course, require students to have a certain construction and understanding of the basic ability and appreciation of art knowledge, and be able to understand and judge the characteristics and differences of different types of art works in class. However, some limitations of traditional art teaching cannot better extend students' perception of artistic works, or they cannot acquire a deeper understanding and association of artistic works, and they also have certain requirements on students' spatial perspective and shaping ability [2]. Using VR technology combined with teaching can make students through the creation experience, to think, to try and activities such as constantly delve into fine arts course of study, through the three-dimensional simulation of art image, structure, sound effects and the outline of the situation so that students in observation and exploration of the aesthetic spirit so as to promote an art core literacy course.

This paper aims to realize the improvement of students' maximum subjective learning ability by combining VR technology in art class, so as to better enable students to understand and understand the three-dimensional dynamics of sensory art works through the visual effect of authenticity. The combination of modern art teaching and VR technology makes the courseware rich and well-made, and brings students into the beautiful and beautiful picture. This not only has the characteristics of interactivity, convenience and multiple perception, but also has enriched the method and content of art teaching. At the same time, VR technology through enhanced visualization and visualization of fine arts to enrich

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teaching contents, lets students understand with the visual effect of authenticity and sensory threedimensional dynamic of fine arts. It is a tool for different teaching situations, and inspires the student to the knowledge of fine arts learning autonomy and initiative important carriers. The application of VR technology in art teaching can avoid the shortcomings of traditional teaching, improve the quality and effectiveness of art education, and promote the development of education in the process of improving the effect and essence, which provides a new form for modern art teaching and realizes its qualitative leap [3]. However, nowadays, VR technology is constantly combined with art teaching to achieve the maximum artistic expression, break the current limitations of time and space in art classes, and truly make new media serve aesthetic education teaching efficiently, conveniently and humanized.



Figure 1. Art appreciation through VR glasses to enhance the sense of reality

II. BRIEFLY DESCRIBE VR TECHNOLOGY

A. What is VR Technology

VR technology, (Virtual Reality, abbreviated as VR), its concept was proposed in the early 1980s. Specifically refers to the use of computer technology in a specific range to generate realistic sensing technology and simulation technology integrated sensing technology and simulation technology immersive interactive environment. In recent years, virtual reality technology to get promotion, the user with the aid of a computer and VR displays medical, scientific research, education, media, aviation and engineering and construction industries, its plane things simulation for the threedimensional solid situation, thereby producing feeling and experience, they are in the real environment to some extent this promoted the rapid development of related industries. VR technology uses multimedia technology and computer technology to make people feel like a real existence and create a virtual environment [4]. The application of VR technology in education and teaching can make the classroom richer, more convenient and more vivid for teachers and students, so as to promote the innovation and development of education and teaching from all levels.

B. The Theoretical Origin of VR Technology in Teaching Practice

The theoretical origin of VR technology in teaching practice has the following three aspects, namely, the teaching thought of constructivism learning theory, the teaching thought of multiple intelligences theory and the teaching thought of immersion theory.

1) Teaching thought of constructivism learning theory Constructivism focuses on learners' initiative, takes learners as the center, emphasizes situational teaching based on infectious real events, and focuses on how learning individuals construct knowledge. Learners actively internalize their own knowledge, use cooperative and exploratory learning to express their ideas through communication and discussion, and improve their ability to think independently.

2) Teaching ideas of multiple intelligences theory

Multiple intelligences include nine aspects of human (space, natural observation, kinesthetic, potential language, music. spirituality, interpersonal communication, introspection, and mathematical logic). The use of VR technology aims to provide personalized teaching experience for students through this technology, with the purpose of stimulating students' potential in various aspects and bringing creativity and imagination for students to learn art. Each student has a different intelligence, some of which is explicit, some of which need to be stimulated by others, and teachers need to provide sufficient resources for students.

3) Teaching thoughts of immersion theory

The theory of immersion was first proposed by Csikszentmihalyi in 1975. It refers to that when people are engaged in some daily activities while paying attention, they will filter out irrelevant perceptions and enter a state of immersion. In teaching, teachers use "immersion theory" to make art courses more immersive, and use VR technology to assist teaching, which can transform students' two-dimensional pictures into threedimensional interactive state, attract students' attention, improve students' learning motivation, and enable students to master art knowledge more comprehensively.

C. Features of VR Technology

VR technology has the following four characteristics: Imagination, Immersion, Interaction and Autonomy.

A. Conceptualization refers to creative activities in the virtual world that can inspire people, enable students immersed in this environment to obtain new instructions, improve perceptual and rational knowledge, and generate new ideas.

B. Immersion means to make students believe in the reality of things in the virtual environment, just like the real objective world. The ideal simulation environment can make it difficult for the user to distinguish the true and false, and it can play a role throughout the operation process.

C. Interactivity refers to the interaction between students and things in a specific virtual environment as in the real environment, in which students are the subject of interaction and virtual objects are the object of interaction, and feedback and interaction can be conducted between the two.

D. Autonomy means that objects in the virtual world can move autonomously according to their own models and rules.

Through constructivism learning theory, multiple intelligence theory and immersion theory, the students are able to view and analyze the significance and value of art works. Students are deeply involved in communication, thinking, discussion, experience, attempt, creation and other activities. The virtual world simulated by VR equipment (Fig. 2) generates an immersive feeling from the aspects of hearing, touch, vision and so on. In the process of further transforming art works from flat and static to three-dimensional and dynamic, students can better appreciate the thought and art of the author and feel the creation process of the author. In this way, students can learn to think in observation and express themselves in creation, both in the learning process and in the exhibition and evaluation of works, so that they can fully feel the wonderful changes brought by VR technology to the art classroom [5].



Figure 2. Students can feel the panoramic image in the classroom

III. APPLICATION OF VR TECHNOLOGY IN ART TEACHING

A. The Application of VR Technology Breaks the Limitations in Space and Time and Makes it More Vivid and Flexible

In traditional art classes, teachers and students spend a lot of time preparing painting materials or manual materials. You also need to become familiar with and adapt to different types of tools and materials in the classroom; After finishing the work, it takes time to sort out the tools and clean the classroom. After the application of VR technology in class, students can free themselves from the troublesome process of preparing materials, sorting out materials, adapting to materials, etc., thus reducing the time and energy consumed in the complicated preparation process, so that they can have more time to fully think about the subject and study differently [6]. Art education is no longer limited by time and space. Students can fully appreciate and even create art works from all over the world in class or after class.

In addition, some unfamiliar or abstract art works are often limited by presentation conditions in traditional teaching. Teachers only describe and appreciate art works through textbooks, picture albums and PPT presentations, which are not conducive to guiding and stimulating students' imagination and creativity. By effectively combining VR technology, virtual situational spaces can be created in students' minds. At the same time, students can see, hear and even touch these spaces. The three-dimensional visual space can more effectively display the composition form of works and the real intention of the author. Art teaching class in virtual reality, art beauty, shine, whether it is a complex architecture, or worth hundreds of millions of the famous paintings are in the virtual space stereoscopic image, vivid and flexible, students just a finger as if they can penetrate the image, these are indeed VR give strong addition to the education [7].

B. The Application of VR Technology in Appreciation Amplifies the Deep Cognitive Conception

Art appreciation is an important part of an art course. Appreciating all kinds of outstanding art works at home and abroad can enhance students' aesthetic cognition and sentiment, and bring students visual and sensory impact. Teachers by VR technology of the virtual works of fine art to make the students form a strong sense of into practical scene, layer upon layer in the course step guide, divergent senses thinking of students, encourage students' participation in observation, cooperation, explore the creation of art beauty and formal beauty, so as to gradually improve the students' aesthetic level, and put forward problems and solving problems through further understand their aesthetic knowledge, realize the allround development of their comprehensive qualities.



Figure 3. The magpie Hua autumn diagram

This paper introduces a teaching fragment to make corresponding analysis, taking "appreciation · Comment" course -- "Into the Autumn Color of Magpie" as an example. The magpie Hua autumn diagram (Fig. 3) for the yuan dynasty Zhao Meng is a printed ink painting landscape painting works, it depicts the ji nan not note and Que Shan mountain region in northeast China The season in the picture is autumn, a quiet, clear and light, some of the leaves have fallen off, but the villagers are unaware of these beautiful sceneries, just immersed in their livelihood. But for the painter, he has a great feeling and spiritual essence of the metabolism of the seasons, the smallness of human beings and the majesty of nature. In the teaching of the course of art appreciation of "Magpies and Autumn Colors", due to the limited teaching resources of the school, some students can only watch the painting through textbooks and pictures of works, and cannot understand the real aesthetic artistic conception of this painting through videos or other means [8]. In two-dimensional works of art, we can only have a preliminary appreciation of the composition, tone, scene, representation, etc. If we want to further explore and understand, it is not so easy. At this time, the teacher introduced the question: "Class, what do you see in this work?" The student responded positively: "Trees, rivers, mountains, houses, meadows..." The teacher continued the heuristic and asked, "What else do you see? "At this moment, most of the students are lost in thought, they are

wondering, what else can I see besides these things, can I associate with the artist's intention and artistic thought between these things I see...

It is very common to encounter the above situations in art appreciation classes in middle schools [9]. At this time, teachers will often narrate the creation source of this work from the historical and author's living background, and further guide students to clarify the creation intention of this work. However, this method is not applicable to every art work, especially if art teachers always teach and think in such a mode of thinking, they will rely more on other things that have nothing to do with the art itself, ignoring the essence of art teaching. VR technology can simulate and reproduce the scenes in the works (Fig. 4) and tell the works from the visual and angle of art, which has an obvious positive effect on art teaching. Using virtual reality technology for students and teachers in this work, such as real village, children playing in the distance, grazing sheep, lifelike shrubs, poet boat tour liked this young to throw in the night sky, etc., all the things of this kind of visibility for students to explore and understand the added function of this art work [10]. In virtual reality teaching, teachers use VR technology to show the three-dimensional internal structure of images to students, and synthesize the composition and situation of real works through color, sound, animation and other later stages. In the teaching, teachers still can adjust Angle using VR technology further use, scaling functions, such as form processing simulation virtual realistic images, near and far from the back, observe the space Angle, texture and object contour, etc., through the VR technology as a tool to enrich teaching content of fine arts, art more effective display of visibility of the image characteristics, the students' understanding, thinking and understanding of art increased significantly, fully embodies the dominant and advantage of new technology in the fine arts classroom.



Figure 4. Viewing paintings with VR mode

C. The Application of VR Technology in the Teaching Process to Create Vivid and Realistic Efficient Situations

The use of VR technology is conducive to the innovation of the drawbacks of traditional art teaching. Art class is no longer the home of teaching materials and PPT multimedia, nor the teaching mode of alternating obscure language and pictures, but a more diversified and multi-carrier deep learning form. In this way, students' experience and understanding of art learning can be greatly improved. Students are no longer passive learners but new learning methods that break through their thinking and vision. Let "teachers teach" become "students learn", free students from all kinds of materials,

according to their own knowledge, skills and interests to choose subjects and directions for learning, through active thinking and active creation to explore the knowledge of art [11]. On the other hand, teachers have changed from former knowledge disseminators into knowledge guides. Teachers and students learn from each other and make progress through communication and exchange.

Next, take the "Appreciation · Comment" lesson -"Riverside Scene at Qingming Festival" as an example to introduce a teaching fragment for analysis. "Riverside Scene at Qingming Festival" (Fig. 5), a painting by Zhang Ze Duan in the Northern Song Dynasty, is one of the ten most famous Chinese paintings. It vividly records the urban life of China in the 12th century. The whole painting is magnificent and fully demonstrates the painter's profound insight into social life and superb artistic expression ability. In the five-meter-long scroll, there are more than 550 different kinds of figures, ranging from the grand canal, shopping gallery, plain, small, paving, decoration, boat and vehicle figures, etc., all of which are uncountable. The scene is vast and rich in content, making people feel like they are in the scene [12]. This art treasure is well known to all, but students often feel that they are familiar with it and ignore the deep value of the art work, unable to explore the real charm of this art treasure.



Figure 5. Riverside scene at Qingming festival

As one of the representative works of figurative art, Riverside Scene at Qingming Festival has a very precious and important meaning. The important contributions of historical materials, whether in painting, history, economy or humanities, are of great value to our human exploration and understanding of the historical period at that time, which is also the height and strength of painting art works. When the teacher is teaching this work of art, he inspires and guides the students through composition, perspective, background intention and content, and asks: "Students, what can you learn about the social scene at that time through this work? "Students enthusiastically spoke up:" we saw people's lives, business, handicrafts, vehicles, folk customs, architecture... In fact, students have strong observation ability and can almost summarize most scenarios through group discussion and summary. But, "What else? When teachers further spread students' thinking and imagination, they are limited by the two-dimensional space of the works. If students want to know more, teachers may discuss history, literature, archaeology and other aspects, but students will never learn from paintings. At this time, the combination of VR technology and painting works can not only reproduce the bustling scene at that time, but

also discover some unexpected things. In fact, Riverside Scene at Qingming Festival is not a rigorous representation of life, but a vivid and interesting documentary of life. When the student saw such scene, often feel very interesting, at this time is the best time to trigger students' interest, teachers can give students the right to ask questions or guidance, student with a keen interest in using their own subjective thinking and unique method to discover and explore the works of fine art, thus love the fine arts curriculum so vivid, lively, meaningful construction process.

VR technology simulates the scene of society at that time in the riverside scene of Qingming Festival (Fig. 6a to Fig. 6b). The scene is lifelike, as if it is real. In the video, we move through the whole composition of the work as the first hero, and enter the life of people at that time through a slowly coming ship. In the virtual scene, we can see the children playing, the women chatting, the talk between the handymen, the heavy footstep of the husband, the gentle call of the camels, the laughter of the restaurant diners, the pedestrians carrying lanterns at night... VR technology not only simulates the animated images of vivid things, but also the sounds of things, so that students can feel the rhythm and breath of life with visual and auditory senses. In virtual reality teaching, students can personally feel the life breath and charm of artistic works, and present us the painting process and mind course of a virtual artist. When VR technology is used to achieve highly effective teaching results, it is the most effective, intuitive and convenient proof for technology, media and future application in art classroom. This kind of diversified and time-oriented innovative teaching not only stimulates students' imagination and divergent thinking, but also broadens students' vision and senses, making students' own aesthetic perception constantly improved and extended.



Figure 6. VR view shows many details in painting

D. The Application of VR Technology to Integrate Skills and Knowledge in the Course and Realize Multidimensional Interactive Teaching

In the fine arts classroom teaching, if teachers need to show students the construction works of art, such as religious architecture, garden buildings, palaces, in order to let the students can be more intuitive feeling of threedimensional view of the three-dimensional graphics, can use the computer 3D modeling and animation software such as geometric sketchpad to establish model, through the rotating display all let the student to carry on the multi-dimensional Angle of view appreciation and observation. On the other hand, teachers arrange classroom tutorials in advance and adopt the VR headset, which is commonly used at present, in the classroom. At this time, students' learning is just like watching a movie, which is relaxed and pleasant, which increases the fun of students' learning to a certain extent. At the same time, the dynamic and sound effects of virtual scenes also supplement the teaching materials. At the same time, students can use virtual reality technology to enter the object and observe its internal structure, so as to improve their appreciation of art works and painting level. VR technology is used to build a three-dimensional object that is the same as the real object, so that students can observe it from various perspectives. For one thing, it saves the production of the real object, and for another, students can spend more time creating works and diverge their thinking.

VR technology can be applied not only in art classes of architecture, but also in art forms such as design, appreciation, painting, sculpture, art ceramics, photography and calligraphy. The application of VR technology in art teaching is an inevitable trend in this rapidly changing digital age. The integration of modern art education and science and technology is conducive to the integration of various skills and knowledge, realizing the characteristics of convenient interaction and multiple perception in art teaching, and contributing to the realization of multi-dimensional interactive teaching mode.

IV. LIMITATIONS OF THE APPLICATION OF VR TECHNOLOGY IN ART TEACHING

Although the use of VR technology to carry out art teaching has brought endless advantages and cultivated students' aesthetic quality and innovation consciousness to a certain extent, we cannot ignore that there are still some problems in the current VR technology. At present, the limitations of VR technology in art teaching are shown in the following six aspects:

A. The current dilemma of VR technology is that the resources of various schools are not enough, some schools have insufficient hardware environment, and the technical threshold of educational resource design and development is high. Meanwhile, the development of VR curriculum also depends on the teachers' understanding and grasp of teaching methods and contents.

B. Due to the immature development of many design software and the lack of high-performance and highconfigured computers to process 3D models, pictures, audio and video, etc., the application level and teaching effect of virtual technology in teaching are restricted.

C. In the teaching process, VR technology does not bring a real environment. Students are immersed in the virtual world, which will interfere with learners' effective absorption of important content and course themes. With too many functions and rich simulation scenes in the virtual world, students tend to be immersed in their favorite part and neglect the construction of the overall knowledge, which makes it difficult for teachers to monitor the learning status of students in class.

D. The application of VR technology in art teaching for students to learn with rich imagination and creativity, but VR technology simulation of art works is the real meaning and intention. It depends on the great knowledge of educators and construction ability, produced by the effect of the virtual and real still to be perfect. At the same time, also note in the technical level and teaching level to bring new challenges.

E. VR technology-related devices are expensive and difficult to popularize. Among them, some of the equipment is bulky and unsuitable for various occasions, and lack of high-performance and high-configured computers to process 3D models, pictures and audio and video, which requires strong economic support from the teaching subject.

F. VR technology is only an extension of teaching means. Instead of abandoning traditional teaching, teachers should choose appropriate teaching methods according to different teaching contents, so that students can change from passive learning to independent inquiry learning through the combination of VR technology and curriculum. In addition, different students' application degrees of computer and other software are not the same. Meanwhile, students' strong subjective randomness in the learning process of art course will also affect their learning effect.

V. EVALUATION OF THE EFFECTIVENESS OF VR TECHNOLOGY

The key point of the evaluation is that the use of VR technology has a good impact and effect on art teaching, which is specifically reflected in the following three aspects (the first two are in the form of questionnaires): students' liking for VR teaching, the embodiment of the advantages of VR teaching, and how to maintain the use of VR technology in the evaluation of teaching.





Figure 7. Whether VR technology is useful for art course

The following data (Fig. 7) were obtained through a questionnaire survey carried out on a population of students aged 16-20 years old, from the university course entitled "How many students like VR teaching". The results showed that most of the students expressed high interest in using VR in classroom teaching and had high expectations for the course content. Among them, the choice that likes very much accounts for 100% of the whole proportion; Choose the preferred option for 100% of the total; The option to know VR accounted for 65% of the total; 45 percent of the respondents said had

experienced VR. The application of VIRTUAL reality technology in art education is very attractive to students, who look forward to VR teaching entering schools and classes, and perceiving and experiencing art works in a highly simulated virtual environment. One of the students, who has never experienced the application of VR technology in an art course, said, "I really feel the vitality of art works in a virtual environment. It's really shocking! I'm interested in the content of art courses that combine VR technology."

B. Embodiment of the Advantages of VR Teaching

The obvious advantages of VR teaching are mainly reflected in five aspects: "More vivid", "Easy to remember", "More interactive", "Easy to understand" and "More focus".



Figure 8. Advantages of VR Technology in Art Teaching

The following data (Fig. 8) were obtained through a questionnaire survey carried out on a population of students aged 16-20 years old, from the university course entitled "Advantages of VR Technology in Art Teaching". The following data were obtained through questionnaire survey, the results showed that "More vivid" accounted for 95.0% of the total. "More Interactive" accounted for 95.0% of the total. "Easy to remember" accounted for 85.0% of the total; "Easy to understand" accounted for 70.0% of the total; "More focus" accounted for 50.0% of the total. Unlike traditional teaching, VR teaching is more conducive to stimulating children's interest in learning. In learning, abstract art images are presented with three-dimensional, three-dimensional and acoustic animation, which makes it easier for students to understand the content of art courses and master important knowledge points in the courses.

C. How to Maintain the USE of VR Technology in Teaching Evaluation

If the project is regularly revised and improved, and if students like the project and give good feedback, the use of the technology will continue. At the same time, teachers can reflect and deal with the problems existing in the application of VR technology in education through the feedback information of students. It is worth teachers' thinking about how to improve and change in the next step of VR teaching. On the other hand, students will also be asked to do an assessment and give comments and suggestions for future projects. Their suggestions will be carefully considered, so this project is perfect for their needs. Teachers of fine arts in virtual reality teaching, should strictly abide by the principle of moderate and appropriate, although VR technology teaching in the future will be more and more important in the position, but the teacher in VR teaching should be combined with the key and difficult point for fine arts courses to enhance students' understanding of knowledge, and constantly improve the students' science literacy and comprehensive quality, to the realization of the teaching process and teaching effect to provide more possibilities.

VI. CONCLUSION

VR technology is simulated in the virtual world that can bring students immersive effects, effectively avoid the traditional teaching mode restricting the formation of stereoscopic thinking, for students to create a real and three-dimensional visual and thinking space, from the vision, hearing, touch and so on to undertake to the student, the construction of an innovative mode, improving students to learn the theme of perceptual and rational cognition. Along with the social from all walks of life pay more and more attention to the cultivation of student's comprehensive quality and ascension, VR technology is applied in the fine arts teaching truly new media, new technology in education, allowing students to develop new construction thinking, to a certain extent, improve the students' learning efficiency, improved fundamentally the traditional fine arts teaching methods and means, realize the integration of multidisciplinary knowledge. In teaching, art teachers actively use virtual reality technology to implement virtual teaching, which can make the art classroom atmosphere more energetic, improve some students' weak aesthetic consciousness, give students more ample time for artistic practice and creation, and help students to significantly improve their interest in the course content. At the same time, the application of VR technology and art teaching make students become the real subjects of learning, and the art classroom becomes more vivid and novel. With strong curiosity and visual impact, students gradually improve their aesthetic cognition of the learning theme. Virtual reality technology to make the students into the art of the inner world, into the artist's inner world, the creation of art to create again, is a kind of new learning experience the art of classroom teaching, and from multiple views, multi-level and multi-angle to cultivate the students' science literacy, effectively through in the form of the art of classroom teaching.

CONFLICT OF INTEREST

The author declares no conflict of interest.

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