

Practice of Immersive Art Education under the Integration of Virtual Reality and Artificial Intelligence

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Abstract: This paper focuses on the immersion art education under the integration of virtual reality (VR) and artificial intelligence (AI). With the development of information technology, traditional art education is facing challenges, and this integration brings new opportunities for it. The purpose of this study is to explore the effective path and mode of immersive art education under this integration mode. This paper uses the method of literature research to sort out the research status quo, and analyzes the feasibility of integration based on the principles of VR and AI technology and the relevant theories of immersive art education. It is found that this integration has obvious advantages in teaching experience, resources and personalization, such as enhancing artistic perception, integrating and expanding resources, and providing customized learning paths, but it also faces many challenges in technology, education and ethics. Based on this, this paper puts forward practical strategies from teaching design, teachers' ability improvement and teaching environment construction, with a view to providing theoretical support and practical guidance for the development of immersive art education and promoting the quality of art education.

1. Introduction

With the rapid development of information technology, the field of education is undergoing unprecedented changes. As cutting-edge technologies, VR and AI bring new opportunities and challenges to art education [1]. Traditional art education mostly relies on physical teaching AIDS, two-dimensional images and teachers' oral explanations, which has certain limitations in teaching effect and student experience [2]. The integration of VR and AI is expected to break these limitations and build a new paradigm of immersive art education [3]. In recent years, VR technology has created a highly simulated virtual environment for learners with its immersion, interactivity and imagination, and has been applied in many fields [4]. In the field of education, it makes abstract knowledge concrete and complex scenes intuitive, which effectively improves the learning experience and effect. AI technology shows unique advantages in data analysis, intelligent decision-making, personalized learning support, etc., and can provide customized learning programs according to students' learning behaviors and characteristics [5]. The integration of the two has laid a solid technical foundation for the practice of immersive art education.

From the perspective of educational development trend, it is an important goal of art education to cultivate students' innovative thinking, practical ability and aesthetic quality [6]. Traditional teaching mode is difficult to fully meet these needs, while immersive art education based on the integration of VR and AI can stimulate students' creativity and imagination by creating realistic art scenes, providing rich creative tools and personalized guidance, and help them achieve their learning goals better [7]. The application of VR and AI in the field of education started earlier in the world, and some studies involved virtual gallery visits and intelligent painting guidance in art education. However, the research on the immersive art education system under the deep integration of the two is still insufficient. In recent years, the related research in China has gradually increased, mainly focusing on the feasibility and advantage analysis of technology application, and the research on practical strategy and specific application mode needs to be deepened.

To sum up, it is of great significance to carry out the practical research of immersive art education under the integration of VR and AI. It is helpful to enrich the theoretical system of art

education and provide theoretical support for the application of new technology in art education. On the other hand, it is expected to explore practical strategies through research, improve the quality and effect of art education, and contribute to cultivating innovative art talents to meet the needs of the development of the times.

2. The immersive art education theory of VR and AI fusion

VR technology, with the help of computer graphics and sensor technology, creates a highly simulated virtual environment. With the help of VR equipment, students can feel as if they are in the real scene depicted by works of art [8]. AI technology is based on machine learning and deep learning algorithms to deeply analyze students' art learning data. Immersion theory emphasizes that individuals reach a state of full devotion in activities. In art education, when students are immersed in the art scene or creative process of VR construction, they can understand the essence of art more deeply and enhance the aesthetic level [9]. Art education aims at cultivating students' aesthetic appreciation, creativity and artistic accomplishment. The integration of VR and AI provides a new means to achieve these goals, inspiring students' creative inspiration through immersive experience, and accurately improving students' ability through AI assistance.

From the perspective of technical complementarity, VR creates an immersive learning environment and AI provides personalized learning support, which complement each other. From the perspective of educational needs, the current art education focuses on cultivating innovation and practical ability. The integration of VR and AI can create a rich creative space, help students turn their creativity into practical works, meet the needs of educational development, and lay a solid theoretical foundation for immersive art education.

3. Advantages and challenges of immersive art education under the integration of VR and AI

(1) Advantages

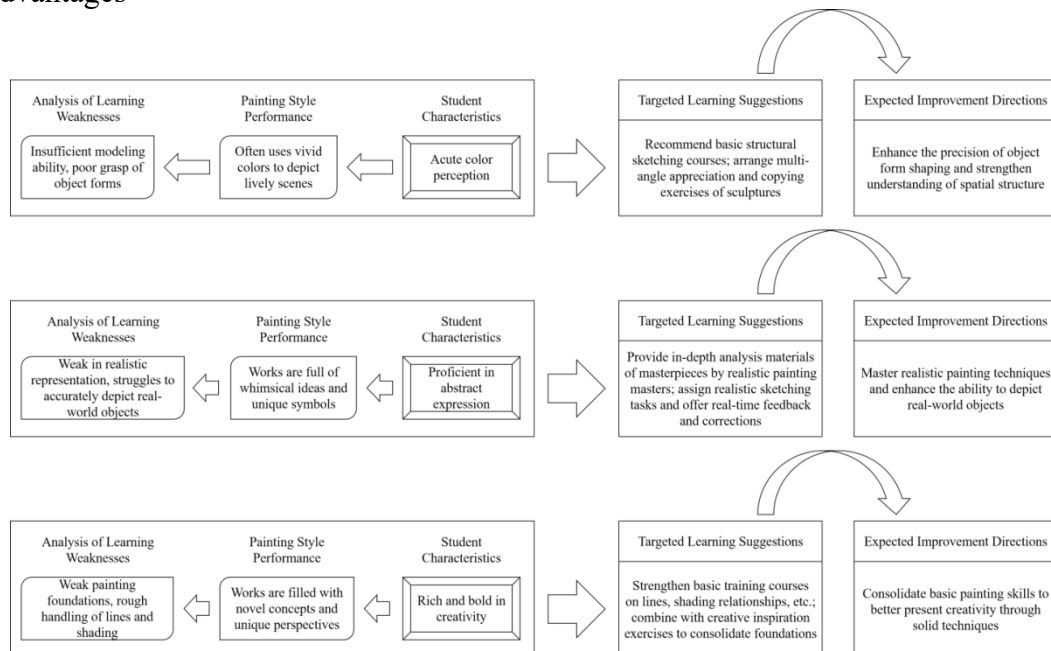


Figure 1 Personalized Learning Path

With the help of VR technology, highly realistic and immersive artistic scenes can be created, and students' artistic perception and emotional resonance can be significantly enhanced. This kind of immersive experience can make students understand the cultural connotation and emotional expression behind the works of art more deeply, and make the artistic appeal that is difficult to convey in traditional teaching vividly present. AI plays a key role in the intelligent integration and expansion of art teaching resources. It can screen out the works and materials closely related to the

teaching content from the massive art database, and personalize them according to the students' learning progress and interest. AI can deeply analyze students' learning characteristics and styles according to their behavior data in the learning process, and then provide them with customized learning paths. Figure 1 shows the specific learning suggestions given by AI according to the characteristics of different students.

(2) Challenges

The integration of VR and AI technology faces many difficulties in equipment performance and system stability [10]. VR equipment requires high hardware performance, such as high-resolution display screen and powerful graphics processing ability, to ensure the smoothness and fidelity of the picture. However, at present, some devices still have problems such as picture delay and dizziness, which affect students' learning experience. The operation of AI algorithm needs a lot of computing resources and data support, and the system may respond slowly or even crash when dealing with complex tasks, which leads to the interruption of teaching process.

Teachers' adaptation to new technology is a big challenge. Many teachers are used to traditional teaching methods, and have limited knowledge of VR and AI technologies, so they need to spend a lot of time and energy to learn the operation and application of new technologies. In addition, the existing teaching evaluation system is difficult to adapt to the art education under the integration of new technologies. Traditional evaluation is mainly based on the final presentation of students' works, but under the new technological environment, students' learning process, innovative thinking and cooperation ability should also be included in the evaluation scope. How to build a comprehensive and scientific evaluation system needs to be solved urgently.

The application of technology may bring about ethical problems such as privacy protection and originality of artistic creation. In the process of data collection and analysis, students' personal information and study data are at risk of disclosure. At the same time, AI-assisted creation may lead to controversy over the originality of artistic works. How to protect students' rights and interests and maintain the purity of artistic creation while enjoying the convenience brought by technology is a problem that must be considered.

4. Practical strategies of immersive art education under the integration of VR and AI

(1) Teaching design strategy

Table 1: Art Teaching Objectives under the Integration of VR and AI

Teaching Content	VR Integration Method	AI Integration Method	Adjustment of Evaluation Methods	Extended Teaching Activities	Interdisciplinary Expansion
Painting Instruction	Create diverse virtual sketching scenes with customizable elements	Analyze brushstrokes and composition, providing real-time optimization suggestions	Increase evaluation of process interaction and adoption of AI suggestions	Organize virtual painting competitions	Explore the application of light and shadow with physics
Sculpture Instruction	Construct a highly flexible virtual space with diverse materials, supporting collaborative creation	Analyze postures and proportions based on ergonomics and aesthetics, providing adjustment directions and style references	Introduce phased evaluations to consider the effectiveness of adjustments based on AI feedback	Conduct virtual sculpture exhibitions	Combine with history to study how styles are influenced by culture
Art History Instruction	Restore important art event scenes with interactive characters for explanation	Conduct in-depth analysis of works, generating style evolution charts for academic perspectives	Increase evaluation of scene interpretation and the use of academic materials	Host virtual debates	Associate with sociology to explore the relationship between art and social change

According to the characteristics of fusion technology, the teaching objectives of art need to be systematically restructured. In terms of knowledge and skills, students are required not only to master traditional art skills, but also to be familiar with creative tools and interactive ways in VR environment. In terms of process and method objectives, it emphasizes the cultivation of students' independent inquiry and innovative thinking through immersive experience and AI-assisted analysis. On the goal of emotional attitude and values, with the help of realistic artistic scenes, students' love for art and cultural identity are enhanced. Table 1 shows more detailed goal setting.

In painting teaching, VR is used to build real sketch scenes, such as ancient European towns, where students can freely choose their own angles to paint, and AI provides real-time color matching suggestions. In sculpture teaching, 3D sculpture creation in virtual space is realized by VR, and the shape is shaped by handle operation. AI gives suggestions on proportion adjustment according to human body structure knowledge. Table 2 specifically presents the fusion mode:

Table 2: Examples of Integration of Different Art Teaching Contents with New Technologies

Teaching Stage	Knowledge and Skills Objectives	Process and Method Objectives	Emotional Attitudes and Values Objectives	Extended Ability Objectives	Interdisciplinary Integration Objectives
Beginner Level	Master basic VR painting tools and become familiar with basic AI-assisted painting analysis	Use AI feedback to paint in simple VR scenes, cultivating self-review	Stimulate interest and experience the charm of technology	Cultivate spatial perception and the ability to locate virtual creation elements	Understand the relationship between art and geography, recognizing the influence of regional colors
Intermediate Level	Skillfully draw in complex VR scenes, master the representation of virtual materials, and use AI to analyze style tendencies	Use AI's cross-style suggestions to complete specific themed creations, exercising innovative thinking	Enhance understanding of styles and cultivate cultural inclusivity	Improve virtual storytelling abilities and use painting to tell stories	Explore the relationship between art and history, interpreting style evolution
Advanced Level	Master the entire process of VR art creation, including 3D modeling, etc., and use AI to deeply analyze works and incorporate them into creations	Use AI's cross-cultural fusion suggestions to complete comprehensive projects, enhancing artistic literacy	Establish an awareness of innovation and inheritance, and strengthen the sense of responsibility in creation	Develop artistic critical abilities and evaluate works in depth	Achieve integration of art and cultural studies, exploring the diversity of expression

The art teaching process based on the integration of VR and AI technology requires systematic design. The first is situational introduction, which presents fascinating artistic scenes with the help of VR and arouses students' interest in learning. Followed by knowledge explanation, using AI to show relevant artistic knowledge and skills, and combining with example analysis. Then students do creative practice and create in VR environment, and AI provides real-time guidance in the process. Finally, evaluation feedback, teachers and AI jointly evaluate students' works, and students improve their works according to feedback.

(2) Strategies for improving teachers' ability

Schools can carry out training for teachers' application ability of VR and AI technology. The training content includes the operation and maintenance of VR equipment, the construction of virtual teaching scenes, and the use of AI teaching software. Online and offline training methods are adopted, teachers are regularly organized to participate in technical workshops, experts are invited

to give on-site guidance, and online learning resources are provided for teachers to learn independently. The renewal of educational ideas, through organizing educational seminars, academic lectures and other activities, promotes teachers to adapt to the transformation of art education ideas under the integration of new technologies. This program aims to guide teachers to fully understand the main role of students in the learning process, effectively stimulate students' learning initiative and innovative consciousness through the use of modern educational technology, and promote the transformation of teachers' roles from traditional knowledge transmitters to guides and facilitators of learning activities.

(3) Strategies for the construction of teaching environment

Schools should plan an art teaching hardware environment suitable for the application of fusion technology. Schools should be equipped with high-performance VR devices to ensure clear and smooth images, effectively reducing users' dizziness. At the same time, it is necessary to build a professional computer room that meets technical standards to ensure that the hardware requirements for the operation of artificial intelligence software are fully met. In addition, specialized VR creative spaces should be planned and constructed to create a higher quality creative practice and immersive experience environment for students.

Schools need to develop and integrate VR art teaching software and AI-assisted teaching platform. The software should have a rich library of artistic materials, diversified creative tools and intelligent teaching guidance functions. The platform can record students' learning process and works, facilitate teachers' tracking and evaluation, and support the sharing and exchange of works among students.

5. Conclusions

This paper focuses on the practice of immersive art education under the integration of VR and AI. Through the analysis of the relevant theoretical basis, the technical principles of VR and AI and their correspondence with the theory of immersive art education are clarified, and it is proved that the integration of VR and AI in art education is theoretically feasible.

In the analysis of advantages and challenges, this paper finds that this integration model has brought many positive changes to art education. In the teaching experience, the immersive scene created by VR greatly enhances students' artistic perception and emotional resonance; In terms of teaching resources, AI has realized intelligent integration and expansion; Teaching individualization can provide customized learning paths according to students' characteristics. However, it can't be ignored that the problems of equipment performance and system stability at the technical level, the difficulties of teachers' adaptation to new technologies and the adjustment of evaluation system at the educational level, and the problems of privacy and originality at the ethical level all hinder the popularization and application of this integration model.

In order to deal with these problems, this paper puts forward practical strategies from three aspects: teaching design, teachers' ability improvement and teaching environment construction. It is expected to promote the effective application of VR and AI in immersive art education by re-planning teaching objectives, integrating teaching contents, designing teaching processes, improving teachers' technical application ability and updating educational concepts, improving hardware facilities and developing software resources.

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