



Integration of Virtual Reality CAD Technology and Classroom Teaching for Higher Vocational College Art Design Major

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Abstract. Virtual reality technology is an important direction of simulation technology, which is the combination of simulation technology and computer graphics. This technology is also a collection of various technologies such as human-machine interface technology, multimedia technology, sensor technology and network technology. This paper reasonably applies information technology in art classroom teaching to improve the quality of art teaching. This is also a problem that art teachers should actively think about. In art teaching, information technology can change teaching methods, enrich teaching methods, and enrich teaching content. The use of information technology can effectively enhance students' sense of participation and creativity. This paper analyzes the related concepts in the field of "design application" on the basis of understanding the technology of the new art curriculum standard division. This paper takes several art courses teaching as basic research cases, and deeply explores the auxiliary role of information technology in it. On this basis, to promote the effective integration of information technology and fine arts courses. In addition, this paper sorts out the process of rapid development and gradual popularization of computer technology.

Keywords: Information Technology; Art Design; CAD Design; Virtual Reality Technology

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1 INTRODUCTION

The application of computer technology in art design has formed a brand-new artistic creation method. Computer art design is a comprehensive discipline, which integrates traditional art design and computer technology. Ahmadkhani et al. [1] believed that Virtual Reality (VR) is an important direction of simulation technology and a way of combining simulation technology with computer

graphics. Yin et al. [2] believed that major hardware manufacturers have also gradually made innovations in technology, such as Samsung, Google, Sony, Xiaomi, etc. These manufacturers are continuing to launch more high-quality and affordable virtual reality products. In the final analysis, art design is a kind of visual design behavior, which mainly brings people the feeling and experience of beauty on the visual level. This technology is a challenging cross-technology frontier discipline and research field. This technology uses a computer to generate a simulation environment, which is a system simulation method of multi-information fusion, interactive three-dimensional dynamic vision and entity behavior. As a contemporary high-tech, virtual reality technology has entered the public eye after more than ten years of development, driven by capital and guided by demand. In recent years, vocational colleges all over the country have been exploring teaching reform methods and innovative methods. Driven by virtual reality technology, Feng and Li [3] believed that many colleges and universities have applied the technology to actual teaching.

However, many colleges and universities are constrained by factors such as teaching methods and technology, and the application of virtual reality technology only stays at a low level. Xu and Zhou [4] believed that virtual reality technology cannot effectively meet the requirements of high-quality talent cultivation. Therefore, it is urgent to explore practical and scientific and effective application methods of virtual reality technology, so as to give full play to the role of this technology in talent cultivation. Zheng et al. [5] believed that the technology is used to improve students' vocational skills and innovate the employability of student groups. From the current art teaching, it can be found that art teaching is gradually linked with information technology. This technology is also a new form for the long-term development of art teaching. According to the "Compulsory Education Art Curriculum Standards (2011 Edition)" formulated by the Ministry of Education, middle school art teaching should teach students basic art theory knowledge. At the same time, Nijs et al. [6] believed that the document also requires students to improve their aesthetic and creative abilities on the basis of having sufficient theoretical knowledge of art. At the same time, the application of information technology in art teaching has not only been limited to the level of teaching means, and the use of information technology in art teaching has become the development trend of today's art teaching. However, it is difficult to improve students' aesthetic ability and creative ability in traditional art classes. However, the application of information technology has changed the teaching concept and teaching method to a great extent, which helps to improve students' aesthetic ability and creative ability.

Computer technology has enriched the variety of tools for art design. The traditional art design tools are mainly pen and paper, paint, ruler and so on. The effect and quality of art design has a lot to do with the accuracy of the tool. Using traditional tools to make ruler and compass drawing is prone to errors. Although the error is not large, Dimonte et al. [7] believed that it still has some influence. The application of computer technology in art design can solve this problem well. Compared with previous design methods, computer technology has greatly improved the efficiency and quality of art design work. In addition, Prestowitz et al. [8] believed that the effect of art design has become more abundant because of the application of computer technology. Taking Photoshop software as an example, designers can make full use of various functions in art design to accurately modify and improve design works. These software operations leave no trace of modifications. Taking color as an example, there are freer and diverse color choices in Photoshop software, and designers can give full play to their creative thinking. At present, scholars use computer technology to meet the requirements of art design, making design works more refined and closer to perfection.

In the process of artistic expression, computer technology can continue to intervene in the design process, and the field of computer application is also expanding. In the past, the traditional art design and expression methods were relatively stable and solid, and the effect of art design expression was relatively simple. The deep integration of virtual reality technology and CAD technology can make the results of artistic design more three-dimensional and hierarchical. It can realize the formal expression of the dynamic characteristics of art. Jiang et al. [9] believed that

computer technology is a wide-ranging concept, and many design software are mainly used in art design. This software enables diverse expressions such as animation, video, audio and motion graphics. This technology allows the audience to have a deeper and more intuitive understanding and feeling of the connotation of art design works. At present, the most widely accepted and loved is the interactive function in computer technology. Marcus et al. [10] believed that the tools such as Flash character animation, interactive games, and web pages. These tools provide a good channel for the audience to participate in art creation, give the audience space for independent choice and experience, and greatly promote the development of art design.

1.1 Changes Brought by Computer Technology to Art Design Work

Before the advent of computer technology, some art designers had outdated ideas and concepts and lacked creativity. There are also some art designers who have some novel design concepts and ideas. However, due to the limitation of technical conditions, these designers cannot achieve the ideal design effect. The application of computer technology makes such a restrictive design problem easily solved. When computer technology is applied to art design, designers can make full use of suitable design software to express their designs and ideas. Computer technology supports a broad imagination space and creative space for designers, so that designers no longer have ideological shackles. This page enriches the design ideas and concepts of experts, and greatly promotes the progress of art design work through the development of design techniques. The Organization of elements of higher vocational art teaching based on virtual reality CAD technology is shown in Figure 1.

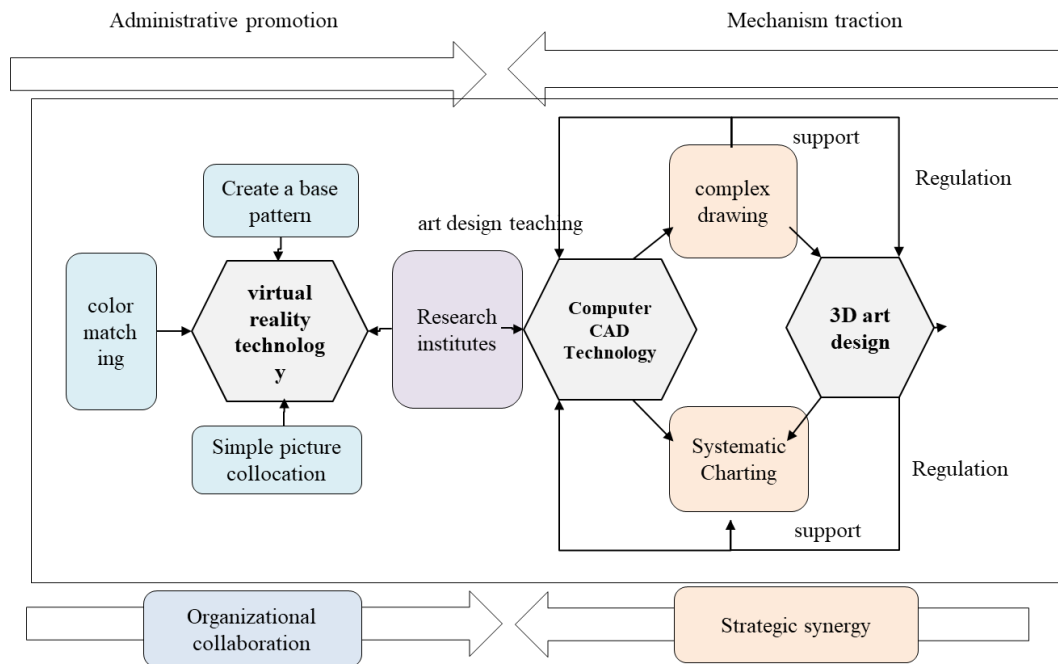


Figure 1: The Organization of elements of higher vocational art teaching based on virtual reality CAD technology.

1.2 The Correlation Between Virtual Reality Technology and Art Design

In fact, there have been successful cases of applying virtual reality technology in the art design industry. Directed by Chad Stansky and starring Keanu Reeves, Ian McShane, and Halle Berry, the action film "Fast Ready" made full use of virtual reality in the film art design process Technology.

Under normal circumstances, traditional movie scene design needs to be completed through 2D graphic design. Only a few filmmakers use 3D software to create pre-set scenes. The designer generated the scene of the hero and the villain fighting in the movie through virtual reality technology. This technology transforms a movie scene into an immersive 3D scene that allows designers to browse and observe. At the same time, 3D software is mostly used as an auxiliary means of application software to provide services. Objectively speaking, the 2D-based graphic design method is difficult to give designers and viewers a better visual experience. In the movie "Quick Preparation", the movie preview scene design uses virtual reality technology. In addition, designers use virtual reality technology to create perceptible, immersive, interactive, and autonomous virtual scenes. The designer can directly experience the impact of the scene on the audience through the head-mounted device. The designer optimizes and adjusts the environment by targeting the composition of the scene, lighting and other factors. The core task of art design workers can further extract the key information of the three elements around the script, and express factors such as characters, emotions, and environment. The design content of the movie script, the specific content that can be provided, has guiding significance for the artistic effect of the movie and the overall concept of the director.

2 APPLICATION PRINCIPLES OF VIRTUAL REALITY TECHNOLOGY IN HIGHER VOCATIONAL ART DESIGN

2.1 Virtual Reality Technology Makes Art Design More Modern

We further analyze the comprehensive analysis of virtual reality technology and sort out the basic characteristics of virtual reality technology. Through in-depth analysis, we can intuitively understand that virtual reality technology provides a relatively broad space and good basic conditions for higher vocational art design teaching. However, the occupation-based attribute of higher vocational education also creates a big problem for the teaching of art design. Professionalization of art creation requires a period of experience accumulation. Virtual reality technology has created good conditions for the art teaching design in higher vocational colleges. However, to truly achieve the purpose of improving the quality of teaching, the following principles must be followed. At the same time, higher vocational colleges want to increase the employment rate of art and design graduates. The school achieves this goal by improving the quality of teaching and improving the comprehensive professional level of students. The analysis of the Structural Relationship between Computer CAD Technology and Higher Vocational Art Education is shown in Figure 2.

2.2 Enrich Teaching Content and Enhance Students' Creativity

First of all, the content of school teaching needs to fully combine the situational nature of virtual reality technology and the professional nature of higher vocational education. In order to improve students' professional competitiveness, higher vocational education must improve the quality of their professional positions. However, the improvement of post quality ability needs to be established under a certain work situation. It is necessary to design a perfect teaching task, use the immersive characteristics of virtual reality technology, break the time and space constraints, and create a virtual reality environment that meets the requirements of the teaching task. Therefore, schools need to strictly implement occupational analysis and occupational investigations, and effectively rectify and optimize the content based on the real process. The school's teaching scene needs to realistically simulate the work tasks of the corresponding positions of the art design major. The school curriculum should integrate teaching, learning and doing to ensure that students' learning behavior can adapt to different environments. At the same time, the theoretical knowledge in higher vocational education can be better transferred to practice. The Correlation analysis between students' emotion recognition and skill training is shown in Figure 3.

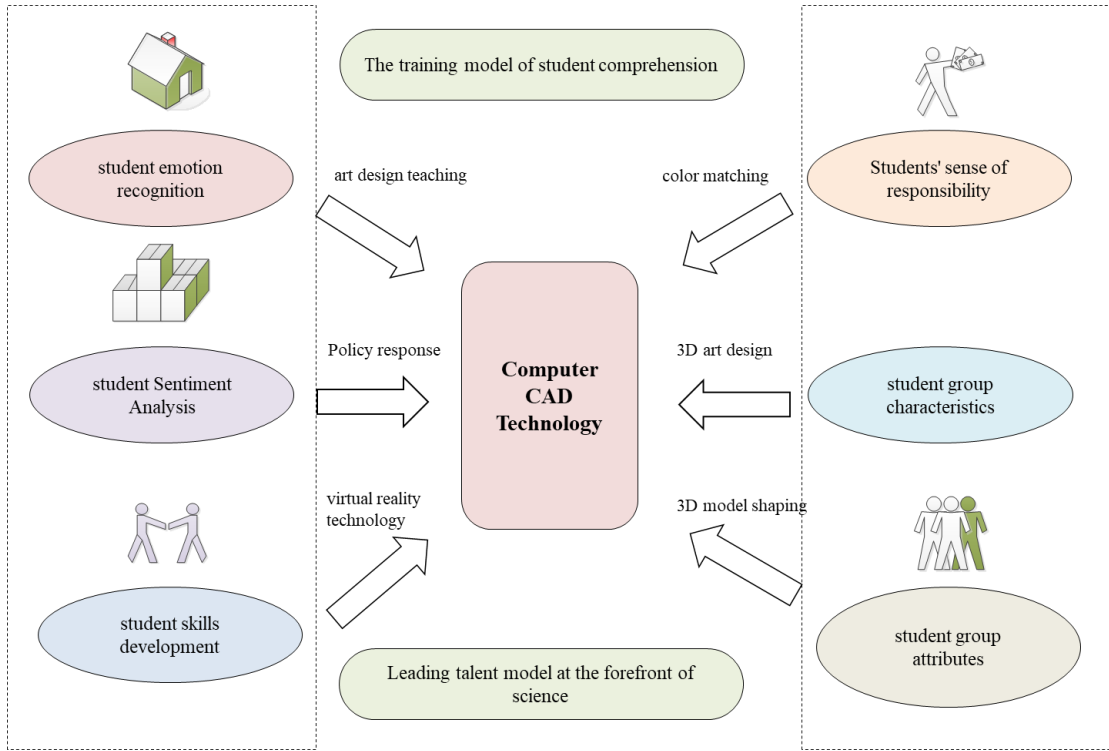


Figure 2: The analysis of the Structural Relationship between Computer CAD Technology and Higher Vocational Art Education.

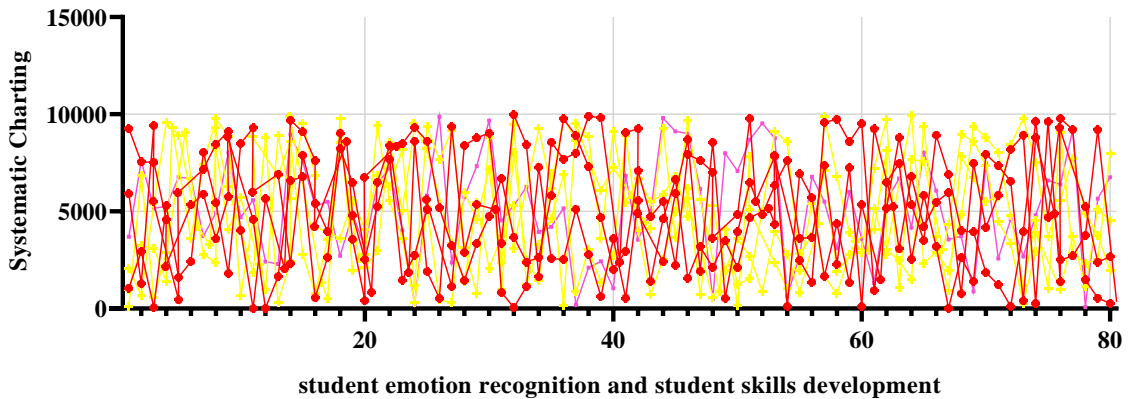


Figure 3: The Correlation analysis between students' emotion recognition and skill training.

2.3 Enrich Teaching Methods to Stimulate Students' Interest in Learning

Secondly, it is necessary to focus on the fusion of typical and advanced. Through the all-round development of students, vocational colleges around the country have also successively explored teaching strategies to improve the content of knowledge and update the speed of students' learning. For example, teaching groups need to make in-depth efforts in school-enterprise cooperation, fixed-post internships, etc. The application of virtual reality technology in art design

teaching also needs to pay attention to these principles. In the process of building a virtual teaching system, we should mainly rely on the typical norms and mainstream design ideas of the art design industry. At present, higher vocational colleges are affected by factors such as untimely updating of knowledge and untimely updating of teaching methods. With the continuous advancement of the teaching reform of higher vocational education and the continuous deepening of the development of science and technology, higher vocational teaching pays more and more attention to the cultivation of competitiveness. Our teaching needs to combine the actual situation of the current industry development to create a scene that meets the real conditions. The school teaching system encourages students to understand the workflow of art design jobs in the process of learning. Through the school's teaching, students can master the ability to solve basic work tasks, so as to better adapt to future job requirements. The Computer CAD Technical Design Requirements and Students' Cognitive Ability System Structure is shown in Figure 4.

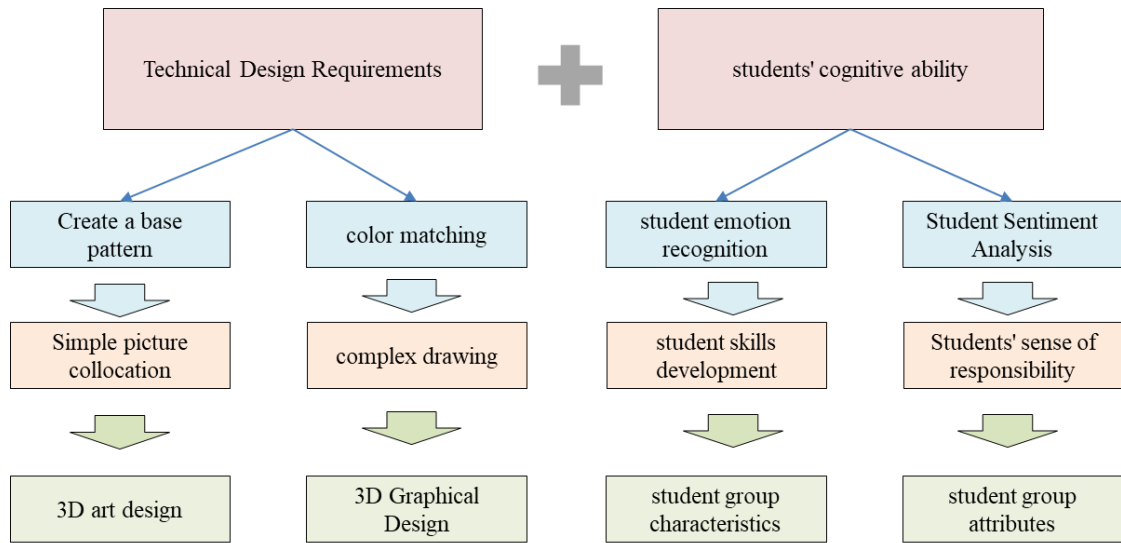


Figure 4: The Computer CAD Technical Design Requirements and Students' Cognitive Ability System Structure.

3 APPLICATION COUNTERMEASURES OF VIRTUAL REALITY TECHNOLOGY IN HIGHER VOCATIONAL ART DESIGN

3.1 Change Teaching Methods and Increase Students' Awareness of Participation

It is the simultaneous display of knowledge and interest. Virtual reality technology is an innovative teaching method. Generally speaking, for most vocational college students, virtual reality technology is more interesting. In the process of art design teaching, virtual reality technology can also give students a better learning experience. In the process of applying virtual reality technology, a practical and comprehensive teaching situation should be created around the teaching content. Through the application of technology, a fun and relaxed teaching atmosphere is created, students' enthusiasm for learning is continuously improved, and their imagination space is expanded. Through school teaching, let the student group master the core concepts and main knowledge content. At the same time, classroom teaching should try to concretize abstract problems and simplify complex problems. The Correlation analysis between computer CAD technology and students' cognitive psychology is shown in Figure 5.

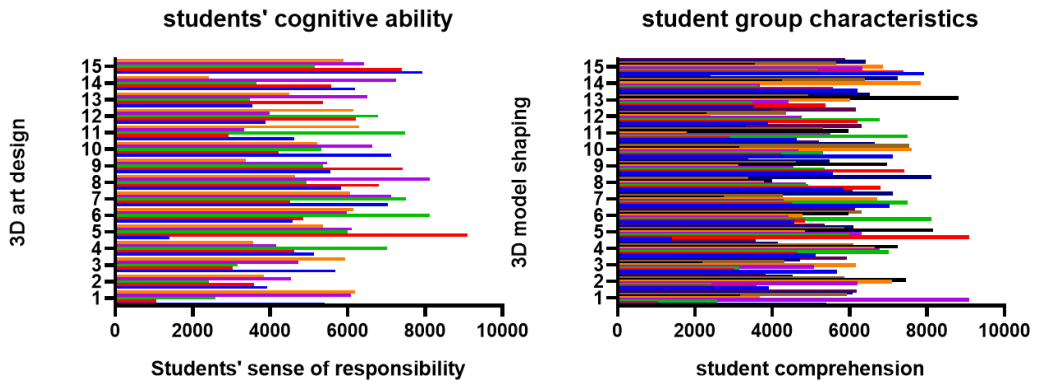


Figure 5: The Correlation analysis between computer CAD technology and students' cognitive psychology.

It is the interaction and intelligence that stand out. Interactivity and intelligence are important features of virtual reality technology, and are also important indicators for rational evaluation of teaching methods. In the process of designing the virtual reality teaching system of art courses, the system should make full use of the interactive characteristics of virtual reality technology itself. By creating a teaching system with high interactive value and support for multi-party collaboration, the system encourages students to exercise their collaborative ability in the learning process. At the same time, through a reasonable technical evaluation method, a true, objective and comprehensive feedback on the students' learning situation is required. The application of the system can reflect the effectiveness of the application of virtual reality technology.

3.2 Application of Computer Technology in Creating Basic Patterns

The application of virtual reality technology to higher vocational art design should fully refer to modern educational technology and educational theory. The strategies mentioned in this paper need to follow the basic principles of applying virtual reality technology to practical teaching under the guidance of blended learning theory. On this basis, fully learn from the information-based teaching design method, carry out the specific design of the system, and its specific content includes the following parts. The comparison of application effects of systematic chart making methods in virtual reality technology is shown in Figure 6.

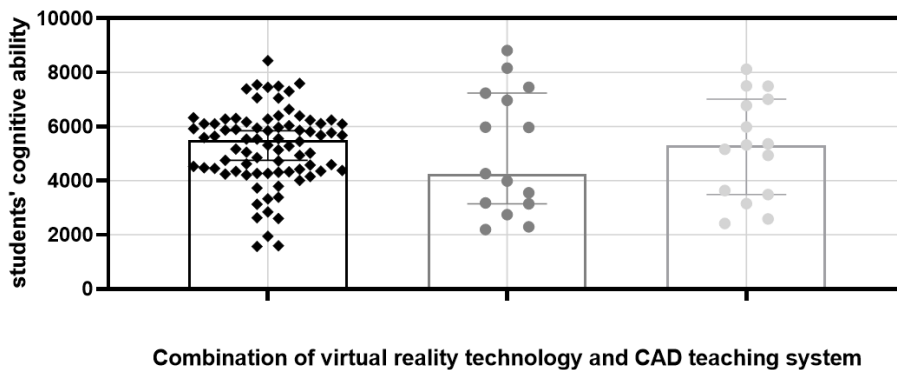


Figure 6: The comparison of application effects of systematic chart making methods in virtual reality technology.

The first is to fully investigate the basic situation of the art design industry. The system analyzes job requirements and industry development trends through the job profiles of past graduates. The system can reveal learner characteristics, teaching objectives, etc. Based on this, the system can determine the desired effect of applying virtual reality technology. The system can clarify the basic abilities that the student group needs to master. Based on this, the system can provide the original data for the subsequent construction of the instructional design system. Specifically, it is recommended that schools go deep into modern enterprises or industry associations to understand the core operational skills that industry elites need to master in their work. The system needs to provide a clear work attitude and production technology, form typical work tasks, and integrate them according to professional ability requirements. The design of the system needs to follow the basic rules of cultivating students' professional ability, and form a typical teaching mode based on the real work process.

3.3 Application of Computer Technology in Color Matching

Secondly, the system needs to make full use of technical means to create a perfect virtual reality art design teaching platform. The platform can reconstruct the functional architecture and technical route of the virtual simulation training teaching system. The platform can also select the corresponding development tools for testing. At present, there are few cases where the art design industry can actively apply virtual reality technology. It is recommended that colleges and universities choose the 3DMAX8.0 platform and SQL2000 database to develop a practical training teaching system. The system can adopt the C/S structure, and the server is directly used to store relevant teaching models, parameter records and other information. This design mode enables students to observe successful art design cases in an immersive state. For example, in the process of art design of the movie "Quick Preparation", the effective interaction between the system and the model is directly realized by using the stunt-vis component and the VR handle. Complete the construction of the art scene and the verification function.

Third, the system can reasonably arrange teaching activities by using virtual reality technology on the basis of clarifying the core content of post teaching and technology application methods. The system determines the sequence of teaching activities, time division, teaching mode, teaching method and other contents. In addition, the system further clarifies the methods of grouping students, learning strategies, learning resources, and learning evaluation methods. The system forms a solution to the problem by presupposing the problems that students may encounter in the learning process. The comparative study on art teaching design of computer CAD technology analysis system is shown in Figure 7.

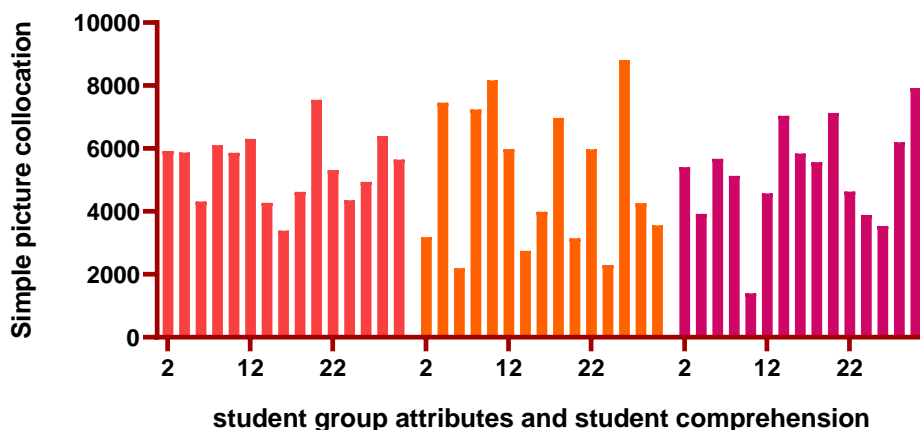


Figure 7: The comparative study on art teaching design of computer CAD technology analysis system.

3.4 Application of Computer Technology in Three-dimensional Design

Finally, the system makes a reasonable evaluation of the teaching effect according to the teaching process and teaching design scheme. It should be noted that the application of virtual reality technology in higher vocational education is still in its infancy. Therefore, this paper believes that the evaluation work needs to start from two aspects. On the one hand, the system needs to test the improvement of students' comprehensive quality according to the preset teaching objectives. The system can assess the skill development of groups of students. On the other hand, it is necessary to check whether virtual reality technology meets the teaching requirements of art design.

At present, existing research focuses on the requirements for setting up job functions, as well as system goals and project import requirements. Teachers can take this as a starting point, and let students' better grasp the learning purpose by reasonably describing the task objectives and task standards. And based on this to make a more comprehensive evaluation. In addition, according to the application requirements of virtual reality technology in art design teaching, the system proposes that the majority of teaching workers should also pay attention to two aspects. The system first needs to clarify the relationship between the application of virtual reality technology and practical teaching. Virtual reality technology has improved the teaching environment of art design majors in higher vocational colleges, but it can only roughly simulate the working environment and is lacking in the construction of new theoretical knowledge. Teaching methods are also insufficient in practical operation, so it is necessary to arrange theoretical teaching and practical teaching content flexibly. Based on this, the use of the system can organically integrate various teaching modes to achieve the best teaching effect.

4 CONCLUSION

In general, virtual reality technology plays an important role in promoting higher vocational education. This technology has a variety of uses in the environment of continuous reform of higher vocational education and increasingly fierce competition in the art design industry. Teaching workers of art design majors in higher vocational colleges all over the world must deeply realize the importance of virtual reality technology for art design teaching. Teachers need to realize the important role of virtual reality technology in skills cultivation and comprehensive development. Through in-depth analysis of the limitations of the traditional education model, the virtual reality system needs to conduct an in-depth analysis of the actual situation of art teaching. According to the teaching principles of art design, the system correctly controls the relationship between skill cultivation and interest stimulation, so that virtual reality technology can truly become the main teaching tool that can improve the quality of teaching. At present, the application of virtual reality technology in skills teaching is still in its infancy, and the majority of educators should strengthen summary and theoretical exploration while continuing to practice.

Secondly, the system can further analyze the difference between traditional skill cultivation and student group interest sublimation. Virtual reality technology has certain entertainment and interesting properties, and plays an important role in promoting the development of students' personality. However, the traditional system lacks a certain degree of professionalism in skill development. In the process of teaching, the system must correctly handle the relationship between students' skill development and interest stimulation. Through a variety of operation modes, students can exercise their ability to solve complex problems. At the same time, it also helps students to improve their problem-solving skills.

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REFERENCES

- [1] Ahmadkhani, N.; Hosseini, M.; Saadatmand, M.: The influence of the female reproductive tract and sperm features on the design of microfluidic sperm-sorting devices, *Journal of Assisted Reproduction and Genetics*, 39(1), 2022, 19-36. <https://doi.org/10.1007/s10815-021-02377-w>
- [2] Yin, D.; Pan, Y.; Wang, Y.: Preparation and performance of electroless silver composite films based on micro-/nano-cellulose, *Wood Science and Technology*, 56(2), 2022, 649-668. <https://doi.org/10.1007/s00226-022-01367-0>
- [3] Feng, W.; Li, X.: Innovative application research on the combination of art design and engineering practice education under the background of new media, *International Journal of Electrical Engineering Education*, 4(14), 2021, 89-98. <https://doi.org/10.1177/00207209211003267>
- [4] Xu, L.; Zhou, Q.: App design of distance art education platform under internet ecological environment, *International Journal of Electrical Engineering Education*, 17(31), 2021, 101-113. <https://doi.org/10.1177/0020720920983526>
- [5] Zheng, W.; Muthu, B.-A.; Kadry, S.-N.: Research on the design of analytical communication and information model for teaching resources with cloud: haring platform, *Computer Applications in Engineering Education*, 4(21), 2021, 83-97. <https://doi.org/10.1002/cae.22375>
- [6] Nijs, M.; Morroll, D.; Lynch, C.: P-786 Virtual continual professional education programs in ART in time of SARS-CoV-2: do they deliver, *Human Reproduction*, 8(15), 2021, 131-142. <https://doi.org/10.1093/humrep/deab130.785>
- [7] Dimonte, V.; Luciani, M.; Conti, A.: Nursing students' perspectives of dance movement therapy to learn relational skills: A qualitative description study, *Nurse Education Today*, 97(5), 2021, 104-113. <https://doi.org/10.1016/j.nedt.2020.104697>
- [8] Prestowitz, L.; Emery, J.-D.; Huang, J.: Polysketch Pen: Drawing from Materials Chemistry to Create Interactive Art and Sensors Using a Polyaniline Ink, *Journal of Chemical Education*, 98(6), 2021, 15-23. <https://doi.org/10.1021/acs.jchemed.0c01330>
- [9] Jiang, S.; Hu, J.; Wood, K.-L.: Data-Driven Design-by-Analogy: State of the Art and Future Directions, *Journal of Mechanical Design*, 9(18), 2021, 1-35. <https://doi.org/10.1115/1.4051681>
- [10] Marcus, D.; Simone, A.; Block, L.: Design thinking in medical ethics education, *Journal of Medical Ethics*, 46(4), 2020, 91-111. <https://doi.org/10.1136/medethics-2019-105989>