Art and Performance Letters (2023)
Clausius Scientific Press, Canada

DOI: 10.23977/artpl.2023.040411
ISSN 2523-5877 Vol. 4 Num. 4

Research on VR Immersive Instructional Design for Art Design Major—Taking Foundations of Design Composition Course as an Example

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Keywords: Art design major, VR immersive teaching, Foundations of Design Composition course, Teaching effect

Abstract: This paper explores using Virtual Reality (VR) in instructional design to enhance the Foundations of Design Composition course in art design. It examines the course's significance and identifies limitations of traditional teaching methods, such as a singular cognitive approach, limited curriculum presentation, lack of interactivity, absence of personalized instruction, and difficulties with abstract concepts. Implementing immersive VR teaching addresses these limitations, improving cognitive instruction, curriculum presentation, interactive experiences, personalized instruction, and comprehension of abstract concepts. A survey demonstrates the feasibility of VR immersive teaching. Practical applications include creating panoramic VR teaching experiences, virtual spaces for engagement, and comprehensive teaching resources. This study enhances art design programs and promotes educational innovation.

1. The importance of Foundations of Design Composition course

"In art design, plane composition, three-dimensional composition and color composition are the most basic three parts, and some unique visual images are mainly formed through the composition of these three parts."[1]The three components refer to plane composition, three-dimensional composition and color composition, which are the basis of artistic design and the core elements of visual art creation. "Plane composition from points, lines, surfaces and other design elements for scientific combination and decomposition, and flexible application to two-dimensional space, so that it has a better visual effect."[2]Three-dimensional formation refers to the creation of three-dimensional object forms in three-dimensional space through the composition elements such as lines, panels and cubes. Color composition refers to creating colorful visual effects through the use and collocation of colors.

By learning the three components, students can master the basic knowledge of combination law of point, line and surface, basic principle of color, decomposition and recombination of spatial structure, as well as common design techniques and skills. These basic knowledge is very important for the study of subsequent professional courses, which can provide students with necessary tools, methods and theoretical support. At the same time, Foundations of Design Composition course as

the basic stage of teaching courses is very key, can lay a solid professional foundation for students, improve their artistic design aesthetic foundation and creative design foundation. Therefore, it can be said that Foundations of Design Composition course has a very important position and function in the foundation of design.

2. The teaching problems of traditional Foundations of Design Composition course

2.1. Simple cognitive way of teaching

In the traditional Foundations of Design Composition course, the singleness of teaching cognition is a common problem. Often, teachers will use traditional methods such as hand-drawn representation, traditional coloring, and hand-making to teach. However, as students vary in their intellectual curiosity and understanding, so will their needs for knowledge. Therefore, it is difficult to meet the expected learning effect of each student by adopting uniform teaching methods and contents.

2.2. Simple presentation of the course effect

In the traditional Foundations of Design Composition course, there exists the problem that the course effect presents a single. Usually, the results are presented in the form of a series of illustrations, which is somewhat backward in the information age. Under the background of today's digital age, basic computer graphics technology has been widely used in art and design majors. Both two-dimensional and three-dimensional visual expression forms have formed regular patterns and are consistent with the final effect of professional design works.

2.3. Lack of interaction in teaching

The lack of interactivity is a common problem in Foundations of Design Composition course. Traditional teaching methods tend to be teacher-centered, which results in less interaction between students and teachers and limited interaction between students. This teaching method limits the interaction between students and teachers and the cooperative learning between students, which affects the in-depth understanding and application of what students have learned.

2.4. Lack of individualized instruction

In the traditional Foundations of Design Composition course, there is a lack of individualized teaching. Traditional teaching often adopts a kind of standardized teaching content and schedule arrangement, which can not meet the personalized learning needs of different students. Each student is different in learning stage, interest direction and learning ability, but traditional teaching is often unable to provide personalized guidance and resource support.

2.5. Difficulty in understanding abstract concepts

In the teaching of art design, Foundations of Design Composition course is the core content of cultivating students' aesthetic ability and creative skills. However, students often encounter difficulties when confronted with abstract concepts in these courses. It is difficult for them to accurately understand and apply these concepts, so they cannot effectively translate them into creative works of art. This problem is common in the traditional Foundations of Design Composition course, which restricts students' learning effect and development potential.

3. Advantages of VR immersive teaching in Foundations of Design Composition course

3.1. Theoretical inquiry

3.1.1. Solve the teaching cognitive mode of simpleness

With virtual technology, teaching methods can provide students with a broader cognitive approach. Visualization teaching allows students to understand abstract concepts more easily by transforming them into concrete images or actions. This visual approach improves knowledge comprehension and nurtures practical and innovative abilities. Through virtual reality and augmented reality, students can immerse themselves in the concepts of the three components and interact with virtual objects, enhancing engagement and concentration. Personalized learning is possible as students can choose content based on their preferences. Virtual technology offers various resources such as simulation experiments, virtual exhibitions, and interactive case studies, allowing students to practice and deepen their understanding of the three components.

3.1.2. Improve the simple presentation of the course effect

VR immersive teaching breaks the monotony of traditional courses by providing diverse and visually rich presentations. Students can explore the three components in a three-dimensional way within the virtual environment, observing material and color changes and experimenting with different compositions. This immersive experience enhances their understanding and retention of the course content. VR also offers practical application opportunities, allowing students to practice and apply the concepts of the three components by adjusting element parameters and observing the effects. Additionally, VR provides instant feedback, helping students identify and correct mistakes in real-time, improving their design skills and creativity.

3.1.3. Provide abundant interactivity

By introducing VR immersive teaching, traditional course limitations can be overcome. VR technology provides diversified visual presentations, allowing students to experience the concepts of the three components in a three-dimensional manner. This immersive experience improves their understanding and retention of course content. VR also offers practical application opportunities, allowing students to adjust parameters and observe the effects. Instant feedback helps students correct mistakes and enhance their design abilities. VR immersive teaching facilitates real-time interaction, stimulating student engagement and promoting cooperative learning. Students can collaborate within the virtual environment, sharing views and learning from each other. Additionally, VR enriches learning experiences by providing access to virtual exhibitions, studios, and labs. Students can choose tasks based on their interests, meeting individual learning needs.

3.1.4. Realize personalized teaching

Traditional teaching in the Foundations of Design Composition course often follows a standardized approach, which fails to cater to the individualized learning needs of students. However, the emergence of VR immersive teaching as an innovative method is gaining significant attention. Through the utilization of virtual reality technology, it offers a new avenue for personalized instruction. This pioneering teaching model allows students to access learning experiences and resources that are customized to their interests, learning styles, and abilities. The advantage of personalized teaching in VR immersive instruction makes it a powerful tool for tailoring the learning environment and opportunities to the specific needs and growth of each

student.

3.1.5. Promote understanding of abstract concepts

"VR+ virtual reality technology is the result of continuous development of multimedia technology, which can bring good experience to users and make people feel the great changes brought by new technology to their lives."[4]Traditional teaching of Foundations of Design Composition often struggles with helping students understand and apply abstract concepts. VR immersive teaching offers a solution to this problem. Through VR technology, students can engage with abstract concepts in a hands-on, immersive learning environment. This helps them visualize and apply the principles of perspective and color theory. VR immersive teaching is a powerful tool that improves students' understanding of abstract concepts, overcomes learning difficulties, and enhances their overall learning outcomes and abilities.

3.2. Teaching research design

3.2.1. Research method

Based on the above analysis, the advantages of VR immersion teaching applied in Foundations of Design Composition course are demonstrated theoretically. Based on this, 120 students (45 boys and 75 girls) from universities in Sichuan Province majoring in digital media art, environmental design, fashion design and product design, who have participated in Foundations of Design Composition course, but do not physically reject VR equipment, were selected by questionnaire survey from March to May 2023. Carry out the teaching courses of VR immersion three components, and understand their opinions on the application of VR immersion teaching in Foundations of Design Composition course, in order to prove the advantages of VR immersion teaching.

3.2.2. Teaching process

By carrying out VR immersive teaching for 192 class hours, this study designed a complete teaching process, including three key stages: teaching knowledge, practicing knowledge and making works.

First, in the knowledge teaching phase, we introduce the basic concepts, principles and techniques of the three components to students through the use of virtual reality technology and immersive learning environment. Through the use of VR devices, students can enter the three-dimensional space in the virtual world and experience the application and effects of different components. They can freely observe and explore various composition situations, feel the actual effect of plane composition, three-dimensional composition and color composition. This immersive learning style greatly enhances students' understanding and perception, helping them better understand abstract concepts and principles. Next, in the knowledge practice stage, students will consolidate the three components of knowledge through specific practical activities. Through the practice activities in the virtual space, students can use VR tools to draw the plane composition map, simulate the three-dimensional composition model, adjust and compare different color schemes, etc. This practical learning style enables students to have a deeper understanding and grasp of the skills and methods of the three components, and cultivates their observation, analytical ability and creativity. Finally, in the production stage, students will apply their knowledge and skills to create their own design works. Students can use VR technology to create virtual exhibition space and show their design works in a real way. They are free to manipulate and adjust the various components of their work in a virtual environment, observing how it behaves in different angles and

lighting conditions. This provides a creative platform for students to better adjust and optimize their design work, demonstrating a deep understanding and application of the three components.

3.2.3. Questionnaire design

This questionnaire is divided into four relevant dimensions for the five advantages of VR immersive teaching, and corresponding questions are proposed according to the dimensions, with a total of 20 questions set, in order to obtain the research subjects' opinions on the application of VR immersive teaching in Design Composition course. Likert scale was used to ensure that the questionnaire was scientific.

3.2.4. Research results and analysis

A total of 120 valid questionnaires were obtained in this survey, with scores ranging from 20-40 accounting for 1.67%, 41-60 accounting for 5.83%, 61-80 accounting for 40%, and 81-100 accounting for 52.5%. In Design Composition course, compared with traditional teaching, 92.5% of students with positive emotion and 7.5% with negative emotion for VR immersion teaching.

After a comprehensive analysis of the questionnaire results, it can be seen that most students hold a positive or moderate attitude towards the issues involved, which demonstrates the advantages of VR immersive teaching compared with traditional Foundations of Design Composition course of the field. However, some students show relatively low recognition in some dimensions. These results provide clues for further research to explore the causes of these differences and develop appropriate improvement strategies to improve students' recognition and acceptance of the advantages of VR immersion in Foundations of Design Composition course.

4. The concrete application of VR immersive teaching in Foundations of Design Composition course

4.1. Create panoramic immersive experience VR teaching

"Art design teaching has more practical class hours, which aims to provide students with the opportunity to apply theory to practice, so as to improve students' design ability."[5]VR immersive teaching in the Foundations of Design Composition course provides extensive and in-depth learning experiences. It allows students to understand and apply the concepts of plane composition, three-dimensional composition, and color composition through multimedia resources and virtual experiments. The immersive nature of VR teaching enhances student engagement and flexibility in learning. It creates a realistic learning environment where students can explore and apply the principles of the three components. VR immersive teaching promotes active learning and helps students improve their design practice abilities. It offers a panoramic and flexible learning experience, allowing students to grasp the knowledge and skills of the three components effectively.

4.2. Construct the virtual space that teachers and students participate in together

VR immersive teaching creates a virtual teaching space where students and teachers can interact. The virtual space can be three-dimensional or planar, allowing students to freely explore and interact with the teaching content. Teachers can present resources in various formats and utilize interactive functions to engage students in real-time interaction, exploration, and creation. This interactive teaching approach enables teachers to adjust and optimize the content based on student needs and feedback, while also allowing students to provide real-time feedback and participate actively in the learning process. The virtual space enhances the teaching effect by providing a

realistic learning environment that improves the depth and breadth of learning. It also enhances students' creativity and imagination, resulting in a more meaningful learning experience.

4.3. Establish abundant teaching resources

VR immersive teaching offers numerous advantages in building rich teaching resources. Firstly, it provides a diverse range of resources, including 3D models, animations, sound effects, and videos, which intuitively present and explain abstract concepts, enhancing students' understanding and memory. Secondly, virtual spaces can simulate real teaching scenes, enabling students to engage in practical operations and experiments, fostering their practical skills and creativity, particularly in art design. Additionally, virtual spaces facilitate the storage and sharing of teaching resources, eliminating the need for physical textbooks and enabling students to access resources conveniently. This not only benefits students' learning but also saves time and effort for teachers. Lastly, virtual spaces offer teachers a creative and innovative platform. Unlike traditional methods limited to classroom explanations and demonstrations, VR immersive teaching allows teachers to create various engaging and innovative teaching scenes and resources. Teachers can continuously update and improve these resources, ensuring that the teaching content remains vibrant and fresh.

5. Conclusions

This study explores the use of VR immersive teaching in the Foundations of Design Composition course in art design. It aims to address the limitations of traditional teaching methods and improve the overall teaching quality. By integrating modern technology and adopting various teaching methods, VR immersive teaching engages students and enhances their learning experience. The study highlights the effectiveness of VR immersive teaching in art and design education, promoting students' aesthetic ability and design thinking. It provides valuable insights for the reform and development of art design education. Future efforts can further deepen the application of VR immersive teaching, explore additional teaching models, and contribute to the cultivation of creative talents.

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