Optimization of Visual Communication Design Courses in Chinese Colleges and Universities under the Background of Digitalization

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Abstract. The development of digitalization has had an impact on all aspects of our lives, including education. In China, digital technology such as interactive whiteboards and artificial intelligence has been gradually introduced, opening up new opportunities for the advancement of education Therefore, universities need to update their visual communication design curriculum to keep up with the society's needs. This paper primarily utilizes a literature review to analyze the use of digital tools in visual communication design courses both domestically and internationally. It also examines the various impacts of these tools on teaching and discusses the potential for their application in visual design courses in China. This paper proposes integrating emerging technologies, advanced tools, and interdisciplinary education into the visual communication design curriculum. The use of new media technologies and advanced tools can boost students' creativity and classroom engagement, ultimately enhancing the effectiveness of teaching visual communication design in colleges and universities. Incorporating interdisciplinary education can add diversity to visual communication design courses and equip students with relevant skills for the digital age. Additionally, it is recommended to collaborate with design companies on projects to provide students with real-world experiences beyond the classroom.

Keywords: Visual communication design, digitalization, college education.

1. Introduction

The evolution of modern visual culture has broadened the range of visual communication design education, given rise to new artistic ideas and forms, and significantly impacted the curriculum of visual communication design education [1]. However, there are some issues in the teaching system and digital infrastructure in Chinese universities. Some scholars argue that the issues present in the training of visual communication design professionals in China include a lack of understanding of the needs of talents in the digital age, inadequate training of digital professionals, incomplete course content, and a relatively limited training approach for visual communication design talents [2]. With the advancement of digital tools and the growing societal need for visual communication design experts, visual communication design programs in Chinese universities are encountering challenges.

Currently, digital tools such as artificial intelligence, virtual reality technology, and big data are seldom utilized in professional courses at Chinese universities. For instance, in terms of teaching methods, educators heavily rely on traditional teaching approaches and fail to fully integrate digital tools or offer courses related to cutting-edge technology [1]. As a result, students have limited knowledge about these new technologies. Nevertheless, with the influence of digital technologies, these tools have significantly transformed the working methods and structures within the design industry.

The text discusses the challenges faced in teaching visual communication design through a literature review and potential measures to address these challenges. The research aims to figure out the ways of optimizing Chinese colleges and university design courses through digitalization of teaching methods.

2. Application of digital tools in visual communication design

With the rapid development of science, technology, and humanities in China, there is a push towards high-end technological advancements and modernization in education. Chinese higher education institutions are increasingly incorporating digital tools into teaching, leading to mutual promotion of education and technology [3]. With the development of digital technology, visual communication design also continues to innovate, presenting diversified forms of expression, gradually transforming from the previous traditional static to a dynamic grid. The technical forms of communication also develop from a single media to multimedia, from the two-dimensional plane to the three-dimensional and four-dimensional, and from the previous print design to network information image communication design [4].

The development of digital media technology can help revitalize the traditional visual arts. In the early art of visual communication, opera, and shadow puppetry, influenced by the science and technology of the time, people could only experience art by hearing and watching [5]. Due to the integration of digital technology, the presentation of visual art has evolved. Previously, art was primarily experienced through seeing and hearing, but now it can be felt and touched. For instance, advancements such as 3D films have broadened the accessibility of visual art, allowing more people to appreciate its beauty.

When digital technology is booming, virtualization technology emerges, and designers can apply virtual reality technology to the design process, to improve the work efficiency and design quality of designers. As the core of the digital brush engine - art programming technology, is widely used in creative tool software, virtualization technology can more intuitively express the designer's ideas, and users can also experience design in an immersive way [6]. For instance, users can experience virtual simulations of buildings that haven't been constructed yet or try out new products that have not yet been released [6]. This allows them to understand the designer's vision in advance. Designers can also use Virtual Reality Technology to allow users to interact with virtual vision, and transform traditional paper books into a multi-faceted audio-visual experience through smart terminals [7]. For instance, Time magazine has incorporated an augmented reality reading feature into its content, This allows readers to scan a QR code using the magazine's app, which transforms static paper images into interactive 3D images [7]. Additionally, artificial intelligence is used to introduce new ways of displaying content, enabling multi-angle rotation and interactive effects for images, videos, and audio. Using the latest state-of-the-art display methods, abstract knowledge can be easily understood and learned. Digital technology has revolutionized visual communication design, surpassing the impact of traditional methods with its enhanced sense of presence and reality [8]. Hence, digital tools play a crucial role in promoting visual communication design. Therefore, we should consider whether incorporating digital tools into the visual communication design curriculum can help students grasp abstract concepts, enhance their innovative thinking, and ultimately produce more skilled design professionals to effectively serve the digital media era.

3. Use of digital tools in current design courses and analysis of advantages and disadvantages

3.1. Utilization of multimedia technology in the visual design classrooms

There is a large body of literature that examines the use of digital tools in visual communication design courses in higher education institutions in China. The main carrier of visual communication design is visual symbols, the means is art design, and the purpose is innovative display to realize some kind of communication, implication, and teaching [3]. At present, the display of visual communication design works is still mainly based on multimedia tools developed by media technology, which can make the form of works expressed in visual communication design to be displayed in a more three-dimensional and intuitive form. Therefore, the visual communication design courses in China's colleges and universities are also gradually applying multimedia technology

tools for teaching. Multimedia technology is an innovative display platform that uses visual symbols to enhance the graphical display effect in the classroom and increase students' interest in the content [3]. It also helps teachers and students stay updated on the latest trends in visual communication design and adapt teaching content accordingly. Additionally, multimedia technology has subtly influenced various aspects of our lives by breaking the limitations of time and space in visual communication design teaching [3], increasing classroom interactivity, encouraging independent thinking in students, and optimizing the teaching mode.

Some researchers have suggested that dynamic communication technology can simulate dynamic media presentations using simple shapes, colors, graphics, and text [5]. As a result, dynamic communication technology has been widely utilized in education. For example, the "flipped classroom" approach is employed in education where students watch teacher-produced multimedia content outside of class and review and reinforce the learning material during class time [5]. In order to optimize the teaching of courses, visual communication design course in Chinese universities should align with the current development trends and incorporate new technologies.

3.2. The application prospects of virtual reality technology in visual communication design courses

In traditional art and design teaching, there are some issues: poor teacher-student interaction, low student knowledge acquisition, lack of emotional stimulation, and difficulty cultivating habits [8].To meet the high standards of the design market, design education should evolve to embrace digital diversification. Virtual reality technology can be used to create a high-fidelity simulation environment, which can streamline the entire process from design to manufacturing and from production to marketing. This will help students learn industry practices effectively [6]. Furthermore, integrating practical experience with professional knowledge can enhance students' interest in learning and promote innovative thinking. By incorporating visual communication design into the curriculum through virtual reality technology, students can work on design tasks and projects in a virtual environment [8]. They can freely unleash their creativity, develop product concepts, and manipulate product structures using interactive equipment such as helmets and gloves [8]. Additionally, they can receive feedback from the virtual environment and make adjustments accordingly. This approach better prepares students to navigate professional challenges in the real world. The integration of virtual reality technology can significantly reduce the time and design costs in the design process for students, enhancing the efficiency of design. It also allows students to unleash their creativity and fully enjoy professional design courses without limitations. Compared to traditional face-to-face teaching, virtual reality technology offers students an immersive learning experience. For instance, when exploring in a painting of the works “thousands of miles of rivers and mountains”, students can now be transported back in time to truly appreciate the beauty of ancient landscapes, rather than relying solely on graphics and verbal descriptions [6].

Additionally, virtual reality enables low-cost, low-risk experimentation. For example, the geological crystallography learning system developed by China University of Geosciences (Beijing) uses virtual reality to demonstrate the structural properties of crystals, providing students with a clearer understanding and identification process [6]. Considering the courses offered by China University of Geosciences, there are promising opportunities for integrating virtual reality technology into the visual communication design course. The addition of virtual reality technology can enhance the immersive experience of visiting the exhibition of visual communication design, better convey students' design ideas, promote the exhibition to other locations, meet the needs of people who can visit at any time and place, and overcome the limitations of time and space.

However, there are still some challenges in virtual reality technology, making it difficult to use in design classes at Chinese universities. On one hand, the high degree of immersion and presence can make participants believe that they exist in a non-physical world, disconnected from their consciousness in the real world [9]. On the other hand, the limited adoption of virtual reality technology in teaching and learning environments can be attributed to teachers' lack of training. This

issue is often associated with insufficient time for learning how to use virtual reality equipment and the need to modify traditional curricula to incorporate new media. Additional barriers include the high cost of equipment, potential discomfort caused by prolonged use, and the risk of equipment overheating [10].

3.3. The possibilities of interdisciplinary combination of artificial intelligence and visual communication design

As the use of artificial intelligence in visual communication design becomes more widespread, AI technology is also creating new opportunities for art education. Similar to online teaching platforms, virtual art galleries, and intelligent assistant creation tools, students can access learning resources online anytime and anywhere. This allows teachers to interact with students in real-time, improving learning efficiency [11]. AI technology can serve as an assistant in the classroom. With the help of artificial intelligence, teachers can provide personalized teaching tailored to each student's needs. Students can access learning materials suited to their cognitive abilities. Additionally, AI can offer timely feedback to the teacher on the overall class situation and each student's learning progress, which can be particularly beneficial for students with weak learning abilities [12]. Artificial intelligence can assist teachers in quickly finding relevant works of art related to their teaching content, thus saving time in the classroom. Additionally, teachers are limited by their own energy and time constraints, and may not be able to promptly respond to students' questions. The integration of artificial intelligence can enable personalized tutoring for students outside of class hours, shifting the focus from teachers to enhancing students' autonomy [13].

Some scholars have proposed that interdisciplinary education will be the trend of future development, especially courses involving various art disciplines, in the latest 2022 edition of the “Graduate Education Discipline Catalog” will be -86-International Journal of Mathematics and Systems Science design is positioned as a cross-disciplinary category of first-class disciplines, indicating that the design profession is closely linked with inter-professionalism and interdisciplinarity, and applications such as “Design + Artificial Intelligence” and “Visual Communication + Digital Media” [14], Visual communication design + immersive technology, Multimedia technology + visual communication design, Artificial Intelligence can assist design students in artistic creation and expression, and at the same time can provide diversified Artistic creation tools. For example, machine learning-based algorithms can generate sketches, color schemes, or composition suggestions for artworks to help students gain design inspiration [15], while AI can also provide personalized creation guidance based on each student's design style. For example, AI can relatively reduce the time cost of researching relevant works by learning analytics and recommending algorithms that recommend suitable references to artists' works based on each student's level of learning and their own design style. The initiative of interdisciplinary education can promote the development of the visual communication design program in a more cutting-edge direction, and at the same time help students improve their innovative thinking, get more design inspiration, and stimulate more creativity in interdisciplinary learning and practice.

In the field of design, some scholars in ceramic jewelry design courses are incorporating AI illustration and 3D printing technology into their classroom teaching [16]. This has created a new teaching approach, Students can use AI drawing technology to quickly generate various design schemes and then use 3D printing technology to bring these designs to life [16].In the visual communication design class, we can propose integrating AI drawing technology and 3D printing technology. This integration can significantly reduce the time students spend on design, from the initial draft to the final product implementation, while also enhancing their design efficiency and practical skills.

However, it is important to consider the challenges that students may face when using AI illustrations. Some scholars have pointed out that students might use AI tools as a shortcut to create their work, leading to academic misconduct [17]. Excessive reliance on artificial intelligence tools can diminish students' creative abilities and critical thinking skills. Scholars have also raised concerns

about the originality, copyright, and potential infringement risks associated with artworks created by AI painting tools, especially as the legal framework and market conditions around artificial intelligence continue to evolve [18].

Besides, the definition and impact of plagiarism in the context of AI training are still unclear. Different national laws have varying treatments for AI generation, which affects creators and users worldwide [19]. For the classroom utilization of artificial intelligence in visual communication design, educators must ensure that they effectively address students' requirements and norms for AI usage.

4. Suggestions for the optimization of the visual communication design curriculum in China

Multimedia technology can be integrated into visual communication design courses in Chinese universities. The inclusion of the flipped classroom in multimedia digital technology enables students to learn at their convenience, overcoming the limitations of time and place. Some scholars have utilized case analysis, with digital media professionals examining first-grade students as research subjects [20]. In one instance, an advertising design course incorporated digital tools and the flipped classroom approach [20]. By previewing content and analyzing homework cases, students showed higher completion rates for logo design assignments, increased enthusiasm for learning, and improved efficiency.

Moreover, virtual reality technology should be integrated with the deep theoretical knowledge of the visual communication design curriculum in Chinese universities. The article discusses the use of virtual reality technology in the visual communication design course at the China University of Geology, specifically in the context of crystallography. It suggests that integrating virtual reality technology into the course can provide students with immersive experiences to enhance their understanding of art history and facilitate a multi-perspective appreciation of art. Additionally, some scholars believe that the novelty effect of virtual reality can motivate students to participate in the classroom and improve their learning efficiency [21].

For interdisciplinary education in visual communication design courses, the vision of integrating artificial intelligence with visual communication design has been proposed. The use of 3D printing technology and artificial intelligence in jewelry design courses suggests that similar techniques could be applied to visual communication design courses. Artificial intelligence has the potential to offer personalized teaching methods and promote interdisciplinary education, thus sparking innovation among students. In addition, through immersive classes, participation in competitions, and collaboration with companies, we can cultivate students' ability to solve practical design challenges and prepare them for the professional world.

5. Conclusion

In summary, with the development of the digital age and the increasing need for visual communication design talent in the market, traditional methods of teaching visual communication design may not suffice to meet the demands of the times. To address this, visual communication design courses can integrate digital technologies from other fields such as digital media, virtual reality, and artificial intelligence, as well as incorporate interdisciplinary education. Additionally, teachers of visual communication design in Chinese universities can enhance their teaching methods, update educational resources, and improve the classroom environment. By using digital tools, teachers can increase student engagement and provide personalized learning experiences, ultimately helping students understand cutting-edge technology and develop their creativity and practical skills. This transformation of traditional teaching methods is necessary to meet the needs of the design industry. This paper specifically focuses on integrating digital tools in visual communication design classrooms and does not discuss other design courses. However, there is potential for exploring the applications

of digital tools in other art classrooms in the future, such as in illustration, animation production, film and television production, and stage design.

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