

Research on teaching of digital illustration design in vocational colleges in the era of artificial intelligence

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Abstract: Artificial intelligence technology is slowly making its way into the field of art design, bringing new ways to be creative, express yourself, and enjoy art. This is part of a trend toward combining digitalization and materialization. As an indispensable part of the art design program in higher vocational and technical colleges, digital illustration design courses are facing unprecedented opportunities and challenges. Emphasizing the current application status of artificial intelligence technology in the art field and combining it with the development trends of the times, we need to update the course design. By making artificial intelligence technology the core of teaching, we can strengthen the cultivation of practical skills and innovative thinking, adapting to the needs of diversified and personalized art education, thereby opening up more possibilities for cultivating the design talents needed in the new era.

Keywords: Artificial Intelligence; higher vocational colleges; digital illustration design course; teaching optimization

1. Introduction

With the rapid advancement of artificial intelligence technology, its impact on various industries has become increasingly significant, and the field of art design is no exception.^[1] Digital illustration, as an artistic expression that blends technology and creativity, not only aligns with the trends of the times but is also facing unprecedented challenges in the wave of artificial intelligence-generated content. For higher vocational colleges, digital illustration design courses are a crucial component in cultivating professional illustration talent, and they are encountering new opportunities and challenges. In the context of the artificial intelligence era, how to improve course instruction to ensure students can acquire the latest skills and meet market demands has become an urgent issue that needs to be explored and addressed.

2. Basic overview of artificial intelligence technology

2.1. The development process of artificial intelligence technology

The development of artificial intelligence technology has undergone many changes, and it has now entered a new stage of deep learning and big data-driven. From germination to today, it can be divided into the following four stages:

First, the period of budding exploration (194s-1956). During this period, the paper "Can machines Think" published by "Turing" proposed that "measuring whether a machine is intelligent" provided the earliest standard. Then, in 1951, IBM scientist Arthur Samuel developed a chess computer program that was an early application of artificial intelligence in the game industry.

Second, the Expert System Period (1956-1980s). The term "artificial intelligence," introduced at the Dartmouth Conference in 1956, marked the official birth of the discipline. Since then, expert systems have become a research hotspot, such as the DENDRAL system, which can predict the structure of organic compounds in the field of chemistry. Meanwhile, symbolic processing technology developed rapidly, enabling machines to understand and process natural language. However, due to limitations in computing power and difficulties in theoretical development, artificial intelligence entered its first "cold period" from the early 1970s to the 1980s.

Third, the Machine Learning Period (1990s-2010). During this period, with the improvement and development of computer processing capabilities, especially with the emergence of big data

information technology, machine learning once again attracted attention. In 1997, IBM's DeepBlue computer defeated world chess champion Garry Kasparov, marking a significant milestone in the development of artificial intelligence. At the same time, during this period, artificial intelligence also made certain progress in areas such as speech recognition and image recognition, with speech recognition technology beginning to be applied in the recognition of simple voice commands, among others.^[2]

Fourth, the large model period (2011-present). In 2012, AlexNet's breakthrough achievement in the ImageNet image classification competition marked the arrival of the era of deep learning. Then, in 2016, AlphaGo defeated world Go champion Lee Sedol, an event that demonstrated the great potential of deep learning and reinforcement learning in handling complex tasks. In 2017, the Transformer model developed by Google provided a key technical support for the field of artificial intelligence to step into the era of big models. By November 2022, the launch of ChatGPT has further promoted the development of artificial intelligence technology, bringing it into a new stage of development. Large models have been widely used in many fields, such as content creation, autonomous driving and health care, due to their scale scalability, adaptability of multi-task and plasticity of capabilities.

2.2. Application status of artificial intelligence in the field of art design

Design is the process of combining art and technology based on scientific and technological principles to make products that are both useful and aesthetically pleasing and can meet people's material and spiritual needs. In the field of art design, the application of artificial intelligence is gradually deepening, optimizing, and enhancing work quality and efficiency while also promoting the diversification of artistic expression forms and carriers.^[3] Currently, the integration of artificial intelligence exhibits characteristics such as diversity, breadth, and comprehensiveness. According to the analysis of artificial intelligence applications in different art domains, for instance, in graphic design, AI tools can quickly generate initial design sketches based on user input needs and style preferences, significantly improving design efficiency. For example, some intelligent design software (such as Canva) can automatically generate layouts and element combinations for posters, brochures, and more, requiring designers only to make simple adjustments and optimizations; in illustration design, AI technology can be used for tasks such as image generation, style transfer, and image restoration. Through deep learning algorithms, AI can learn from a large number of illustrations, generating images with specific styles or converting the style of an image to another style, providing illustrators with new creative inspiration and expressive techniques. At the same time, for some damaged illustrations, human intervention is required. Intelligence can utilize image recognition and restoration techniques for both restoration and repair. The integration of artificial intelligence has expanded the possibilities for art development, but it has also presented numerous challenges.

3. Analysis of the current situation of digital illustration design courses in vocational colleges

3.1. Course teaching objectives and course setting

When students take digital illustration design classes at higher vocational colleges, the main goal is to help them learn the basic ideas, skills, and creative ways of digital illustration. This way, they can use digital drawing tools to make illustrations and develop artistic aesthetics and creative thinking. The course structure typically includes modules such as basic drawing training, operation of digital drawing software, illustration composition and color coordination, and creation of different styles of illustrations.

However, in the era of artificial intelligence, this traditional course teaching objective and setup have certain limitations. The course teaching objectives involve less content related to the application of artificial intelligence technology in illustration design, failing to adequately cultivate students skills to adapt to the demands of the times. The course setup lacks content related to artificial intelligence, such as the principles of artificial intelligence painting algorithms and the deep application of intelligent painting tools, leading to students lacking the necessary knowledge and skill reserves when facing the changes brought by artificial intelligence.^[4]

3.2. Student skill level and market demand

From the perspective of student skill levels, students majoring in Digital Illustration Design at

higher vocational colleges can reach a certain level in traditional painting skills and operation of digital painting software, but their understanding and mastery of the application of artificial intelligence technology in illustration design are relatively low. In the creative process, they mainly rely on manual drawing and traditional design thinking, lacking the ability to use artificial intelligence tools to broaden creative ideas and improve creative efficiency.

In terms of market demand, with the deepening application of artificial intelligence technology in the field of art design, the market's demand for compound talents who are proficient in illustration design and can skillfully use artificial intelligence tools continues to grow. Enterprises and clients expect illustrators to leverage artificial intelligence technology to quickly produce creative sketches, achieve stylistic innovation, and effectively collaborate with intelligent design systems. However, there is a certain mismatch between the digital illustration design talents cultivated by higher vocational colleges and market demand. Students typically need a period of adaptation after graduation to meet market demands, which also reflects the disconnection between current curriculum teaching and market demand.^[5]

4. Optimization path of digital illustration design course teaching in higher vocational colleges under the background of artificial intelligence

4.1. Reconstruct new course content with artificial intelligence

To address the challenges brought by the transformation of artificial intelligence technology, it is particularly crucial to reconstruct the course content. Higher vocational colleges must inject "new" elements, update course content, continuously focus on the latest trends and technological applications in the field of art design, and integrate this new knowledge and these skills into the curriculum system.^[6] First, course design should emphasize interdisciplinary integration. Under the impetus of artificial intelligence, digital illustration design courses should collaborate with fields such as computer science and data analysis. In computer science courses, the development history of artificial intelligence should be introduced, with teachers explaining basic concepts, development processes, algorithm principles, and other content to provide students with a comprehensive understanding of this technological field. In digital illustration courses, examples of the application of artificial intelligence in digital illustration design should be emphasized, such as intelligent image generation algorithms, style transfer technology, image recognition, and restoration technology, etc. At the same time, course content should include the latest achievements in the development of artificial intelligence, allowing students to understand the development dynamics of this field, especially the opportunities and challenges brought by artificial intelligence to digital illustration design. The updating of course content should aim at enhancing students' abilities; that is, under the influence of artificial intelligence, what abilities and technologies do students need to master? This is what higher vocational colleges should focus on. When updating course content, it is essential to consider carefully important issues such as setting up innovative practice courses to guide students in exploring how to combine artificial intelligence technology with traditional illustration creation methods to create innovative illustrations and encouraging students to use AI tools for creative inspiration and then refine their work through manual drawing or digital painting software, achieving innovative, collaborative creation models between humans and machines.

4.2. Innovative teaching methods and student interaction modes

The implementation of digital illustration courses in higher vocational colleges typically follows the following model: theoretical lectures, teacher demonstrations, skill-specific training, software operation learning, and work evaluation. The traditional teaching model is monotonous, leading to low student interest. With the development of artificial intelligence technology, digital illustration techniques are showing a trend toward diversification, and accordingly, teaching methods also need to be innovated and reformed.^[7] Firstly, project-driven teaching emphasizes the completion of projects as the core, guiding students to master course content and achieve teaching objectives through project practice. For example, "using AI to generate specific style illustration elements and integrating them into urban-themed illustration creation." Groups of students collaborate and divide tasks, utilizing AI software to generate materials, design compositions, and optimize details. During the process, groups regularly report progress, and teachers and students jointly discuss technical issues such as color deviations and style mismatches in AI-generated images, promoting deeper knowledge acquisition through practice. Secondly, practice-oriented teaching emphasizes students' practical skills in an

artificial intelligence context. Case analysis applies theoretical knowledge to real-world scenarios. Higher vocational colleges should fully take advantage of the benefits of "industry-education integration" by working together with the business world to offer internships, practical training, and project collaborations to their students. This way, students can learn while working in real workplaces. An artificial intelligence laboratory is established with advanced equipment and tools to promote students independent exploration and experiment in a resource-sharing environment, so as to deeply understand artificial intelligence technology and cultivate their problem-solving ability and innovative thinking.

4.3. Integration of digital resources and intelligent management

Integrating digital resources is an important means to improve the quality of course teaching. The integration of digital technology into education has led to the generalization and fragmentation of student learning, resulting in low learning efficiency and difficulty in deep learning. Integrating artificial intelligence into course resources can make a large amount of digital resources systematic and clear. In fact, higher vocational colleges need to gather and organize many teaching materials about AI and digital illustration design in order to make new courses. To do this, they need to add AI digital resource systems like Pexels, Pixabay image databases, Midjourney online courses, and Mita Online courses in order to create a unique digital teaching resource library for the school. By leveraging artificial intelligence methods, disorganized knowledge systems can be visualized through "knowledge graphs," facilitating students' autonomous learning and knowledge expansion. At the same time, artificial intelligence technology can be used to manage and recommend teaching resources intelligently. For example, based on students learning history and interest preferences, intelligent recommendation systems can push suitable teaching resources to students, improving the utilization efficiency of learning resources.

When it comes to managing courses, smart tools like Learning Management Systems (LMS) and Intelligent Attendance Systems are used to keep an eye on and change students' progress in real time, making sure that lesson plans are carried out effectively. The Learning Management System can automate intelligent tasks like managing exams, setting up and grading assignments, and scheduling classes. This makes teaching easier and less time-consuming for teachers. The Intelligent Attendance System uses AI technologies like facial recognition and fingerprint recognition to automatically manage student attendance, catching any problems with attendance right away and upholding academic integrity. Through the application of intelligent management tools, teachers can focus more on optimizing teaching content and providing personalized guidance, further improving teaching quality. Meanwhile, students can access precise resources through the intelligent recommendation system, enabling them to grasp knowledge more efficiently, develop practical skills, and lay a solid foundation for their future career development.

4.4. Build an illustration design course communication platform

To promote students' understanding and recognition of the latest developments in the field of digital illustration, higher vocational colleges urgently need to build an exchange platform for illustration design courses within the school to encourage interaction and cooperation among students, teachers, and industry experts. Firstly, improve the existing school-enterprise cooperation exchange platform. The school-enterprise cooperation model is crucial for enhancing students' practical skills and market adaptability. Higher vocational colleges should improve the existing school-enterprise cooperation model, fully utilize enterprise resources, and invite excellent enterprises to hold specialized knowledge lectures on campus. For example, the "ArtLab x Cloud Work Openness AIGC Introduction and Practice University Special Session" event organized by Jinhua Vocational and Technical School invited enterprise experts to provide lectures and courses for teachers and students, introducing the application of AIGC technology in illustration creation and combining practical operations for teaching and exchange. Through such activities, students can not only master cutting-edge technology but also broaden their career perspectives. Secondly, establish online exchange platforms both inside and outside the school. Utilize social media platforms such as WeChat, Xiaohongshu, and Douyin to create course exchange groups. Teachers can post course updates and assignment requirements on these platforms; share works with students, and exchange learning experiences; students can upload their works through the platform, receive immediate feedback, and promote mutual learning. Finally, set up a teacher discussion platform. The school should regularly organize teacher training, mainly including basic cognition of artificial intelligence, cutting-edge achievements in artificial intelligence + education,

and applications of artificial intelligence in the field of art, etc. Specialized training sessions are conducted through exchanges and cooperation with industry experts to explore and enhance teaching standards deeply. At the same time, enterprise experts are invited to provide in-depth training for teachers, enabling them to delve into the internal workings of enterprises to learn about the deep application of artificial intelligence in the art field, understand the standards of talent required by enterprises, and promptly adjust course content and methods to improve the quality of talent cultivation while enhancing teachers teaching skills and professional proficiency in the field of artificial intelligence technology.

5. Conclusion

The era of artificial intelligence has brought new opportunities and challenges to the teaching of digital illustration design courses in higher vocational colleges. By using AI to rebuild course content, come up with new ways to teach and interactive models, combine digital resources and smart management, and create communication platforms, these improved methods can effectively raise the quality of course teaching and train digital illustration design professionals who can keep up with the times. Higher vocational colleges should actively respond to the changes brought by AI, continuously explore and innovate teaching models, and provide more innovative and practical composite talents in the field of art design, promoting the development and progress of the digital illustration design industry.

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