# Application of Midjournal and Stable Diffusion in Environmental Art and Design Courses in Higher Education Institutions

**HAN Bing**
(School of Architecture and Art, North China University of Technology, Beijing 100144, China)

**Abstract** This study was aimed to explore the feasibility of introducing two mainstream AI drawing applications, Midjournal and Stable Diffusion, into the environmental art and design courses in higher education institutions. On the basis of introducing the development history of AI drawing technology, the characteristics of Midjournal and Stable Diffusion and their applications in teaching were described in detail. The analysis on its practical application in public space design courses showed that AI drawing technology could significantly improve students' creative efficiency and the possibility of artistic creation, while also enriching the expressive power of design. In spite of the challenges such as technical accuracy, response to complex design requirements, hardware dependencies, and student dependencies, the application of AI drawing technology had an overall positive prospects in the field of education. Finally, the value of AI drawing technology in teaching was emphasized, and the challenges it brought were discussed, as well as how to fully utilize this technology while maintaining teaching objectives and educational principles.

**Keywords** Artificial intelligence, AI drawing, Environmental art, Teaching practice
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In the past few years, the rapid development of artificial intelligence (AI) has attracted widespread attention, especially in creative fields such as AI drawing technology. This emerging technology is no longer just a revolution in the field of technology, but has a more profound impact on social structure and education systems. This study explored how to introduce two mainstream AI drawing applications into the environmental art and design courses in higher education institutions, in order to attempt to reshape existing educational methods and analyze the new challenges and opportunities they bring[1-5].

## 1 Related concepts and development

### 1.1 AI drawing technology

AI drawing technology is a kind of creative tools based on artificial intelligence that can generate images based on users' text descriptions. These tools typically use advanced machine learning models, such as deep neural networks, to understand users' descriptions and create corresponding visual content. Users can input specific or abstract text descriptions, and AI drawing tools will try their best to generate images that match the descriptions. This kind of tools are widely used in fields such as art creation, design, education, and entertainment, and are widely welcomed by society for their ability to quickly create unique visual works from simple text prompts.

Essentially, the development history of AI drawing tools is a combination of artificial intelligence and advances in computer graphics. This process can be roughly divided into the following 6 stages.

(1) Early exploration. From the 1950s to the 1970s, computer graphics began to develop as a discipline. Early computer artists and programmers began to try using computers to generate images and graphics. However, based on the hardware and software conditions at that time, this exploration was more of an attempt and could not provide specific commercial or productivity value.

(2) Neural networks and machine learning. From 1980 to 2000, with the development of neural networks and machine learning techniques, researchers began to explore how to use these techniques to generate images. During this stage, algorithms mainly focused on pattern recognition and image processing.

(3) The rise of deep learning. Around 2010, deep learning technology began to emerge. This technology has greatly promoted the development of AI drawing technology. Convolutional neural networks (CNN) and other deep learning models made significant progress in image recognition and generation.

(4) Generative Adversarial Networks (GANs). In 2014, Ian Goodfellow and his colleagues proposed GANs, a particularly effective image generation technique. GAN generated realistic images through the adversarial process of 2 neural networks (a generator and a discriminator).

(5) Commercialization and popularization. After 2018, with the maturity of hardware and software technology, AI drawing tools began to be commercialized and popularized. Some companies and research institutions launched AI drawing applications for ordinary users, making it easy for ordinary users to use these tools for creation. After decades of development, AI drawing tools finally began to have broad commercial or productivity value.

(6) Continuous innovation and application expansion. Since 2020, AI drawing technology has accelerated its development and continued to innovate in technology and functionality, resulting in more refined and diverse images. These tools are not only being applied in artistic creation, but are also increasingly being applied in fields such as design, game development, and film production.

Overall, the development of AI drawing technology is the result of a combination of computing power, algorithm innovation, and interdisciplinary research, and this field is still rapidly advancing and expanding.

## 2 Midjournal and Stable Diffusion

Developed in 2021, Midjournal is a relatively new AI drawing tool. This project was developed by a team of artists, designers, and engineers, aiming to explore the application of AI in the creative and artistic field. Midjournal utilizes advanced AI algorithms, particularly text based image generation techniques. Users can generate images by entering textual descriptions, which can be concrete objects, scenes, or more abstract concepts. This tool can generate high-resolution images and is suitable for creating high-quality

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visual works. Midjournal computing is based on cloud technology, so it has less requirements on computer hardware, but requires real-time network connection when used.

Stable Diffusion is an AI drawing tool developed by Stability AI. It is based on the latest deep learning techniques, particularly GANs and Variational Autoencoders (VAEs). The development of this tool is to provide an efficient and easy-to-use AI image generation platform, with a particular emphasis on image quality and generation speed. After being modified by computer enthusiasts in China, Stable Diffusion can run on local hardware without the need for a network, but it has a strong demand for computer hardware.

## 3 Teaching application and evaluation analysis

From February to June 2023, the author introduced AI drawing tools for teaching practice in public space design courses. In the process of teaching practice, appropriate adjustments were made to the previous teaching content. In the theoretical knowledge section, 4 lessons of AI drawing technology explanation were added to help students master the development, current situation, and basic usage skills of AI drawing technology. In the design practice section, in the early stage of the original design assignment, an AI drawing tool usage exercise was added, which allowed students to generate images by using keywords and sentences, helping them become familiar with the application of AI drawing tools. In the later stage of designing assignments, students were required to use AI drawing tools to assist in completing public space design assignments.

After the course, the teacher distributed an anonymous survey questionnaire to all 28 students in the class and conducted interviews. The questionnaire expressed the respondents' feelings through 4 levels: quite agree, agree, disagree, and quite disagree.

The content and results of the survey questionnaire were as follows:

(1) Do you have any understanding of AI drawing techniques before the course started?

In this entry, 0 students chose to quite agree, 3 students chose to agree, 22 disagree, and 3 quite disagree. Therefore, most contemporary college students did not have high understanding of such new technology, and thus there was a lot to improve.

(2) Do you have any understanding of AI drawing technology after the course ended?

In this entry, 3 students chose to quite agree, 22 students chose to agree, 2 disagree and 3 quite disagree. Thus, the training and practice in the course made students develop the ability to use AI drawing technology. From another perspective, it also proved that the teaching application threshold of AI drawing technology was relatively low, and students could quickly master it.

(3) Does your computer hardware perform well while running AI drawing tools?

In this entry, 12 students choose to quite agree, 10 students choose to agree, 5 disagree and 1 quite disagree. So the computer hardware currently used by students could basically meet the needs of AI drawing technology.

(4) Have you mastered the skills of using Midjournal?

In this entry, 20 students chose to quite agree, 6 students choose to agree, 1 disagree and 1 quite disagree. It showed that Midjournal's software has a user-friendly interface and high usability, and most students could proficiently use it.

(5) Have you mastered the techniques for using Stable Diffusion?

In this entry, 5 students chose to quite agree, 10 students chose to agree, 12 disagree and 1 quite disagree. It suggested that the software operation of Stable Diffusion was relatively complex and difficult to apply. Compared to Midjournal, most students had poor application effects after a short period of training.

(6) Has AI drawing tools helped you improve your creative efficiency?

In this entry, 20 students chose to quite agree, 6 students chose to agree, 1 disagree and 1 quite disagree. So, AI drawing technology was of great help to the creative efficiency of students.

(7) Has AI drawing tools helped you expand the possibilities of artistic creation?

In this entry, 18 students chose to quite agree, 8 students chose to agree, 1 disagree and 1 quite disagree. From this, it could be seen that AI drawing technology could help students increase their creative possibilities during the conceptualization and sketching stages.

(8) Has AI drawing tools improved your design expressiveness?

In this entry, 10 students chose to quite agree, 16 students chose to agree, 1 disagree and 1 quite disagree. It indicated that in the expression level of design assignments, AI drawing technology could help students increase the possibility of creation, but the effect was not as good as in the conceptualization and sketching stages.

(9) Will you continue to pay attention to AI drawing technology?

In this entry, 25 students chose to quite agree, 3 students chose to agree, 0 disagree and 0 quite disagree. It suggested that AI drawing technology stimulated students' interest in learning and expanded their technical perspectives.

(10) Do you agree to continue to include AI drawing technology in future courses?

In this entry, 26 chose to quite agree, 2 students chose to agree, 0 disagree and 0 quite disagree. The result showed that the introduction of AI drawing technology into the course of Public Space Design received positive feedback from students, and it could be explored and used in future courses.

Overall, AI drawing tools has aroused great interest among students and enriched the presentation forms of traditional design assignments. Students have made positive evaluations of the course and achieved good results.

## 4 Application scenarios, advantages and disadvantages of introducing AI drawing technology into the courses

After course practice and questionnaire survey, the application scenarios, advantages, and disadvantages of AI drawing technology in the field of environmental art and design teaching in higher education institutions have been roughly constructed.

AI drawing technology can be embedded in the following scenarios in this course. ① Personal and artistic creation: Students can use AI drawing techniques to explore new artistic styles and visual expressions; ② Space design and architectural design: Students can use it to quickly generate conceptual designs, schematic designs, and visual demonstrations; ③ Space rendering production: Students can use it to quickly create visual content and display rough materials; ④ Education and research: Teachers can use it as a research tool to explore the application of artificial intelligence in the field of space art; ⑤ Addressing future needs: By learning AI drawing technology, students can stimulate their interest in learning, understand the current development status of the market, and improve their hands-on ability to meet future market demands.

Overall, with their high efficiency and powerful image generation capabilities, AI drawing tools represented by Midjournal and Stable Diffusion will play an important role in

the future design field and be suitable for various creative and commercial application scenarios. Although there are currently some limitations, it provides a wide range of usage possibilities for different types of users and usage scenarios.

AI drawing technology has many advantages, which can be summarized as follows: ① It can achieve high-quality and efficient image generation. The images generated by AI drawing technology usually have high visual quality and details, and are generated quickly. According to different application settings and student needs, the time required to generate an image ranges from tens of seconds to a few minutes, which far exceeds traditional drawing methods. ② Its software is highly user-friendly. Its interface and operation are relatively more intuitive and user-friendly compared to traditional drawing software, and even for students who have never been exposed to it, a few hours of training can reach a proficient state of use. This reduces students' learning costs and also increases their creative enthusiasm; ③ It greatly expands flexibility and creative freedom. Students can explore different visual styles and themes through various textual descriptions, which greatly expands their flexibility in conceptualization and freedom of creative expression, allowing them to imagine and express design themes from multiple perspectives.

However, like all new things, the introduction of AI drawing technology also exposes some shortcomings in the teaching process. ① The generated image may not be accurate. Due to current limitations in technology, databases, and student usage skills, some of the images generated by AI drawing techniques may not fully match the users' description. For example, AI drawing application cannot understand the connotation of Chinese architectural space because most AI software databases are trained in Europe and America, so the form and content of Chinese architectural space presented by them are completely different from the understanding of Easterners; ② The creations addressing complex design requirements are limited. Although technology has made great progress, most AI drawing tools still have certain limitations in creation, especially when dealing with very complex or specific requests. Such limitations are caused by 2 aspects. Firstly, there is a lack of AI training. AI drawing technology is a framework, and its productivity is determined by the AI database trained by humans. There are currently few specialized databases for environmental art and design, which affects its performance in environmental art and design. Taking Stable Diffusion as an example, most of its databases are trained for the purpose of character and landscape creation, and there are few specialized databases for architectural or environmental art design. Secondly, the limitations of creativity come from students' keyword combination skills. Although AI drawing applications provide an extremely simple operating interface, students still need sufficient skills to communicate smoothly with AI, which requires a certain amount of time for adaptation. ③ The application depends on hardware, software, and network. The use of AI drawing technology requires a certain material foundation. Midjournal requires a stable network connection, while Stable Diffusion requires high hardware requirements. The use of AI drawing applications also requires teachers to have a certain level of computer technology, which is a challenge for colleges, teachers, and students. ④ Students may become dependent on the technology. As the saying goes, "It is easy to go from frugality to luxury, but difficult to go from luxury to frugality." AI drawing technology is an extremely convenient and powerful tool, and students do not need too much energy and investment to achieve unexpected gains. Therefore, students will develop a dependency on AI drawing technology. In the long run, this will have a strong negative impact on students' learning ability and creative thinking ability. Therefore, in course design, teachers should strictly control the use of AI drawing applications and reduce their negative impact.

## 5 Value and challenges of introducing AI Drawing technology into Environmental Art and Design classroom teaching

The process and results of the course show that AI drawing technology has great value for teaching environmental art and design in universities. The application of AI drawing technology in teaching can enrich educational content and bring new perspectives and impetus to traditional teaching methods. It not only enhances students' learning experience, but also provides a new tool to promote creative thinking and interdisciplinary learning. With the further development and popularization of these tools, it is believed that their application in the field of education will be more extensive and in-depth.

While providing enormous value, it also brings new challenges to teachers and colleges. From the perspective of teachers, AI drawing technology requires them to have basic skills in using AI drawing tools, including understanding their working principles, operating methods, and how to integrate them into teaching; with the continuous progress of AI technology, teachers need to continue learning and updating their knowledge base to keep up with the latest technological developments; finally, teachers need to continuously carry out curriculum reform, design new teaching activities, and explore how to use these technologies innovatively to enhance teaching effectiveness.

From the perspective of colleges, AI drawing technology requires schools to have sufficient technical equipment and network environment; at the same time, it is necessary to provide necessary training opportunities for teachers to ensure that they can effectively use these tools for teaching; finally, it is necessary to specify relevant evaluation and regulatory policies to ensure that their use complies with educational ethics and teaching objectives.

## 6 Summary

With the exploration of the application and impact of AI drawing technology in the teaching field of environmental art and design courses in higher education institutions, it can be seen that this technology is not only a symbol of technological progress, but also has the potential to become an important force in promoting the transformation of the design market and educational models. AI drawing technology not only changes the boundaries of artistic creation, but also provides new perspectives and methods for the field of art and design education.

At the design market level, AI drawing technology challenges the definition and values of traditional art and design, promoting the development of innovative thinking. It provides new creative tools for designers and artists, while also sparking discussions on issues such as originality, copyright, and ethics. These discussions are crucial for understanding and shaping future society.

In the field of art and design education, the application of AI drawing technology not only enhances the learning experience, but also improves the effectiveness of teaching. It provides students with new ways to explore creativity and technical skills, while also requiring educators to constantly update teaching strategies to adapt to this constantly changing technological environment.

Although AI drawing technology has brought many positive impacts, the challenges it brings should not be ignored, including technical requirements, student dependency, and the

(To be continued in P87)

personalized guidance of students.

## 4 Reflection and enlightenment

Generative AI technology provides a powerful tool for education, but its application must be deeply integrated with educational theory and teaching practice. Only based on solid educational theory and scientific teaching design can the potential of generative artificial intelligence technology be given full play to and the quality of education be truly improved. Generative AI technology can not only realize the design of personalized learning paths, but also dynamically adjust the teaching content and difficulty to meet the needs of different students and significantly improve the learning effect. In the future, it is needed to further explore how to use generative AI technology to achieve large-scale personalized learning.

The application of generative AI technology needs to be continuously optimized through practice and evaluation. In the process of teaching implementation, it is necessary to adjust the teaching strategy and content in time according to the feedback and evaluation results of students. Through continuous experiments and optimization, the application effect of generative AI technology in education can be gradually improved. The role of teachers in this context also needs to change. Teachers must not only master the methods of technology application, but also have the ability to design personalized learning paths and interactive content. In the future, teacher training and support should be strengthened to enhance their teaching ability in the context of generative AI technology.

In short, the application of generative AI technology in higher education has broad prospects. Technology and education are deeply integrated to optimize teaching design, enrich teaching resources, constantly improve the teaching process according to practice and evaluation, and provide strong support for the innovation and development of higher education. Teachers and curriculum designers should actively embrace this technology and take full advantage of its potential to provide students with a better and more personalized educational experience.

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impact on traditional art and design education practices. In the future, it is necessary to ensure that teaching objectives remain unchanged and clear while technological innovation leads teaching reform.

In summary, the current introduction of AI drawing technology into environmental art and design teaching in universities is a multidimensional and interdisciplinary attempt. It can not only affect the field of art and design teaching, but also trigger profound changes in a wider range of educational levels. While embracing the infinite possibilities of this technology, we should also deeply consider how to fully utilize it while maintaining teaching objectives and educational principles, so as to jointly create a more diverse and colorful future.

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