

## Research on Computer Aided Landscape Planning and Design Strategy

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**Abstract:** This paper combs and summarizes the hot issues concerned by the 21st and previous international digital landscape conferences in 2020, including traditional fields such as parameterization, geographic design, visualization and data analysis, as well as research fields such as UAV and cybernetics. The research direction and development trend of digital technology are analyzed. Interdisciplinary cooperation, artificial intelligence and interactive design will be the hot research directions. As a new design method and idea, the research and development of digital design in China is still in its infancy. As a kind of computer-aided technology, virtual reality technology is different from other auxiliary technologies. Especially for landscape architecture planning and design, it shows great advantages in scheme design and scheme strengthening. The traditional landscape architecture planning and design methods are based on experience and rely more on the feeling, understanding and accumulation of designers. They are lack of scientificity and impartability, and the design results are often probabilistic. According to the current situation of landscape industry and landscape specialty teaching, this paper discusses the reform of teaching ideas, teaching modes and teaching methods of computer-aided design in Landscape Specialty Teaching in higher vocational colleges.

### 1. Introduction

The concept of garden landscape is relatively long and existed before the advent of computers, such as the palace garden landscape in the West and the classical garden in China. And more often only some limited thoughts can be expressed, and they cannot be fully conveyed and expressed to others[1]. At present, China's landscape design has been effectively improved and developed in both technical and artistic aspects, but there are still many problems in landscape design[2]. When entering the design field, it is inevitable to start design creation step by step from the most basic design methodology, professional design theory and artistic accomplishment, which is a recognized process of learning design methods correctly[3]. China's landscape architecture has a history of several decades, and modern landscape architecture has a development history of more than 60 years in China[4]. Taking the natural landscape as the main aesthetic orientation, and integrating the humanistic spirit as the source of inspiration for creation[5].

At the initial stage of the development of landscape architecture in China, it mainly relies on architecture, forestry and horticulture[6]. After becoming a first-class discipline, it needs to further establish its own category and interface. As one of the H important components of human settlements discipline, landscape architecture discipline should not only pay attention to itself, but also actively learn from the experience of other disciplines. To ask the computer to "think about unimaginable and unexpected things"[7]. It is possible to produce new theories, ideas, artistic opinions, new technological progress and new economic and political ideas. " As informatization and digitization gradually affect and change people's way of life, the human living environment space is also slowly changing, and so is the outdoor garden space. Therefore, increasing the research on virtual reality technology assisted landscape architecture planning and design, so as to promote the rapid development of landscape architecture planning and design, which will be an important goal of urban planning in China.

## **2. Basic framework of computer-aided landscape architecture planning and design strategy**

### **2.1. Landscape Architecture Planning Major with a High Intersection of Computer Aided Design and Disciplines**

It is undeniable that CAD has played a great role in promoting the design industry, but the descriptions of these promotion are often "improving the drawing efficiency and accuracy", "transforming from 2D drawing to 3D platform which has been widely used in the industry, and stepping into the period of 3D deliberation scheme"[8]. However, these are only part of the field of CAD technology, It also includes geographic information system (abbreviated as GIS), building information model (abbreviated as building information model), computer-aided ecological design, parametric design technology and other fields. Combined with the actual cases of computer-aided technology in design, this paper describes its application principle and application process[9]. and shows the strong advantages of this technology by comparing with previous design means, so as to confirm the corresponding theory and guide the corresponding conclusions[10].

Taking the landscape design of Xinghua Park in Gaocheng District as an example, this paper introduces the good application of computer-aided technology in data collection and analysis, design concept elaboration and design scheme expression. Applying energy-saving technology to design garden landscape can not only maximize the role of green landscape, but also provide better construction ideas and planning ideas for the whole urban environment. The application of 3D printing technology can effectively reduce the use of various materials, improve the efficiency of engineering construction, reduce the risk of engineering construction, and meet the needs of energy conservation, emission reduction and green environmental protection. Therefore, the application of landscape design technology must start from a higher level of teaching, and combine the historical background, cultural background, national characteristic background, and humanistic background of the city to achieve effective integration of multiple elements. Built on the basis of artistic aesthetics and natural science, it is the product of their combination. The use of land according to local conditions is the key to the planning and design of garden landscape. Carry out scientific and artistic aesthetic planning, utilization and analysis of land, terrain and landform, get perfect solutions, and create an active space more in line with people's aesthetic needs and ecological requirements. For landscape architecture planning and design, in fact, the most direct solution is how to comprehensively use the mature computer software platform for different fields to assist landscape architecture planning and design.

### **2.2. Model Construction and Landscape Architecture Planning and Design**

Based on the plan drawing, the three-dimensional deliberation, and the later performance of the architectural visualization software constitute the misunderstood "computer-aided design system" of landscape architecture, which should be called computer-aided drawing. Computer-aided technologies such as two-dimensional precise drawing represented by CAD, three-dimensional modeling, virtual reality experience, and the support of geographic information systems have greatly improved the efficiency of landscape design, improved the quality of works, and extended the designer's attention. thought of. The original intention of landscape design is highly humanistic and scientific. Only with humanism can we meet the needs of more people; Only when it is scientific can it meet the overall planning and layout of the city. Therefore, it is necessary to carry out effective research on landscape design technology combined with humanistic thinking. In addition, geographic information system, building information model, virtual reality technology, computer-aided ecological design and parametric design technology have been gradually applied to the design field. In particular, the application of virtual reality technology in the planning and design of landscape architecture has greatly improved the scientificity and rationality of the design.

As the basic form of design concept and scheme expression of landscape architects, hand-painted drawings are mainly divided into two types: Sketch and front drawing. A very important way to stimulate design inspiration is to draw sketches by hand. Designers connect many of their inadvertent ideas through drawing pens, so as to build the prototype of garden design scheme. The author thinks that it is necessary to re-recognize the content of computer-aided design, expand the

narrow knowledge that computers were only used in cartography in the past to the knowledge of computer simulation-aided planning and design analysis related to the disciplines of landscape architecture planning and design, correct the misunderstanding of parametric design, and attach importance to computer-aided design, which is conducive to the development and application of landscape architecture computer-aided design.

### **3. Virtual reality technology assists garden landscape planning and design**

#### **3.1. Basic concepts of virtual reality technology**

Virtual reality technology was originally developed by the U.S. military, and it is mainly used in military theory and training scene simulation. It is also known as spirit realm technology, and its essence is computer simulation technology. The main development aspects of virtual reality include system simulation, virtual roaming, computer protection, image graphics, virtual dynamic roaming, and human-computer interaction. Through professional equipment, users can transmit their own instructions and feelings to the computer, so as to realize the command and operation of virtual scene objects, and the computer can present the user's instructions and feelings through the virtual environment, and provide information feedback to the user. In fact, virtual reality system is the perfect platform for users' imagination and creativity. It completes this task through computer technology and various hardware devices, and perfectly presents the blueprint in the designer's mind through the virtual environment.

"Graphic visual design tools such as models and simulations are becoming more and more mature and constantly integrated. We are sure that when these technologies are more applied to high-end design fields, more interactive relationships will be built between designers and each design element. This process is BIM, and it's changing us to focus more on full-life-cycle cities, building systems" and complete a unified model for clear and error-free communication between architects, engineers, builders, property managers, and owners, to predict the actual performance of buildings before construction begins, create sustainable designs, increase productivity and pioneer new ways of working. Based on the combination of pure learning and professional knowledge related to landscape architecture design, and through computer-aided learning, digital aided design and software platform, promote the development of digital aided design of landscape architecture. As many theories and technologies of landscape architecture digital aided design are introduced from similar professional disciplines, the adaptability of related technologies has not been widely verified, the data format conversion between software is not smooth, and there are many similar factors, which seriously hinder the progress and development of landscape architecture digital aided design methods.

#### **3.2. Change the way of teaching**

Computer aided design is a professional compulsory course for landscape technology major in higher vocational colleges. The teaching content of the course should reflect the characteristics of higher vocational education. Strengthen pertinence and practicability. The software commands and tools taught should be commonly used in drawing professional drawings of gardens, and the operation commands and tools that are not commonly used or can not be used at all can be omitted. To strengthen pertinence and practicality, the software commands and tools taught should be often used in drawing professional landscape drawings, and the operation commands and tools that are not commonly used or not used at all can be completely omitted. Therefore, it is necessary to carefully design typical examples related to gardening to teach each knowledge point, and to explain each knowledge point clearly and thoroughly, so that students can fully understand the specific functions of tools and commands in the software, and what effects can be achieved. With the support of digital technology, the landscape architecture industry can solve problems in more fields and solve problems such as terrain, geology, hydrology and ecology on various scales. At the same time, it is necessary to combine with various professions and communicate and cooperate with many different stakeholders, such as architects, planners and engineers. Figure 1 shows the specific

procedures of virtual reality technology-assisted landscape architecture planning and design.

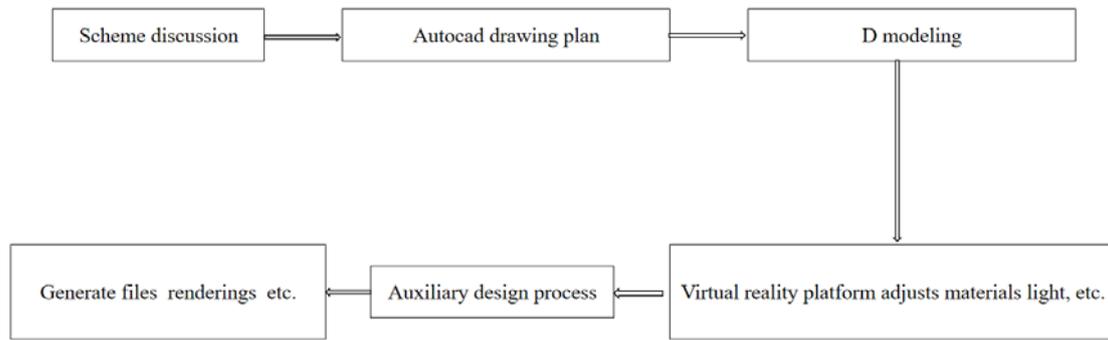


Figure 1 Implementation procedure of VR technology assisted landscape planning and design

As can be seen from the above figure, virtual reality technology assists landscape architecture planning and design, and the first step is to determine the design scheme; Then, the scene plan is drawn, which is mainly realized by Auto CAD software. Secondly, modeling is carried out through three DMAX; Thirdly, the virtual reality platform is used to adjust the light and materials, and bake the whole. Finally, executable renderings and animations are generated.

It can be seen that the research on the planning and design mechanism of parametric landscape architecture not only has a high degree of methodology, but also comes from design practice, and will ultimately guide design practice. As seen in Figure 2

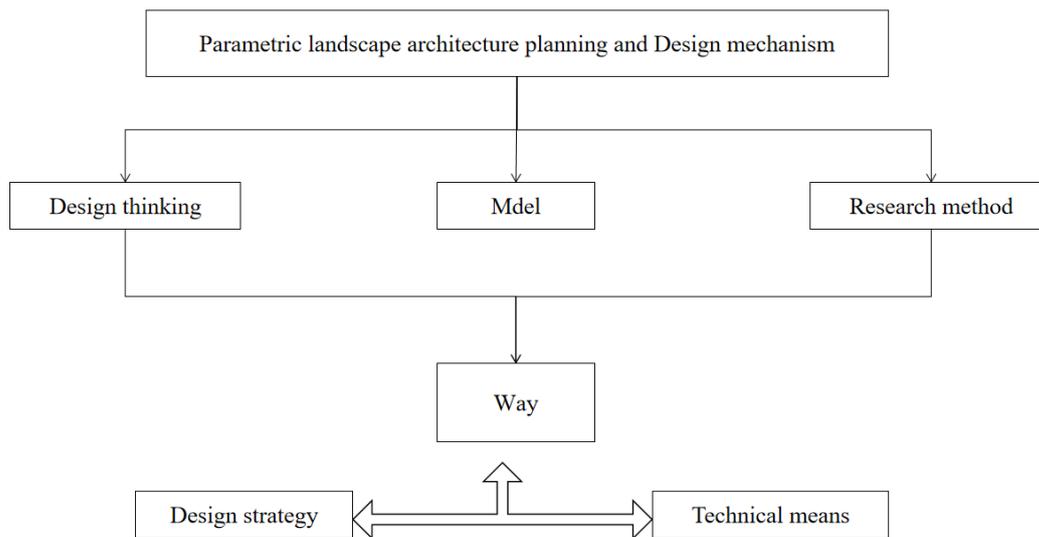


Figure 2 Schematic diagram of parametric landscape architecture planning and design mechanism

In the early stage of landscape project design, the use of computer virtual reality system for communication, evaluation and expression is conducive to the integration of thinking in all links of landscape design and the continuous improvement and progress of creativity. In the field of engineering, mechanism refers to the structure and working principle of machine, or the structure, function and mutual relationship of organism. Nowadays, the research on mechanism has been widely carried out in both natural science and social science. The core of mechanism lies in how the system works. The research on mechanism is to explore the internal work or operation mode of the system composed of things, including the relationship between the components of things. The interpretation of mechanism is the in-depth cognition of things and the process from phenomenon description to essence interpretation. Therefore, the course of computer aided design is to enable students to comprehensively use these three design software, flexibly and freely complete the design and drawing process of garden landscape project plan, elevation, effect drawing, image drawing and construction drawing, and express the designer's design intention quickly and

aesthetically.

#### 4. Conclusion

There are still some problems in the application of digital landscape. For example, the accuracy and reliability of basic data sources need to be improved? The related algorithms and technologies can't solve the complicated social problems in landscape architecture. However, it is undeniable that the continuous development of digital technology enables landscape architecture to meet various challenges, and digital technology will be an important tool for landscape architecture development and a hot research direction in the future. Therefore, in order to enable students to better master this technology, it is necessary to rationally organize the teaching content and methods of "Computer Aided Design for Gardens", so that students can better master the three softwares of AutoCAD, 3dsMax and Photoshop within the limited school hours. Applications in garden design. Here, the research on the space generation method of Jiangnan private garden based on parametric technology has ended. Because of their own ability and time constraints, there are still many deficiencies in the views and research methods in the paper. Based on the strong interest in digital design, I hope to learn more methods and accumulate experience in my future study and work, and further improve and apply the steady research problems to practical work.

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