Analysis of Computer Aided Landscape Planning and Design Strategy

Yanjie Liu¹, Fan Xu²*

¹Gongqing College of Nanchang University, Jiujiang City, Jiangxi Province, China, 332020
²Gongqing College of Nanchang University, Jiujiang City, Jiangxi Province, China, 332020

*Corresponding author e-mail: xufan@ncu.edu.cn

Abstract. Since the 21st century with the computer revolution and the rapid development of information technology, urban planning and design, landscape planning and design and architectural design with the rapid development of information technology and brought about by the reform. By the landscape architecture design along with the computer aided modeling to designers brought infinite possibilities and creativity. There are essential differences between computer technology and traditional technology. As computer 3 d modeling technology and traditional technology and the distinction that having essence can quickly to the designer to construct 3 d model to the designer a more intuitive visual experience, also has better veracity and can give designers a better perfect the inspiration, also can give the audience more angles to watch design through the virtual technology, not only deepened the understanding of designer’s intent, and immersive feel. This paper takes virtual reality technology as the research object and focuses on its specific application in auxiliary landscape planning and design.

Keywords: Computer Technology, Virtual Display, Landscape Architecture

1. Introduction

Although landscape planning is easy to say, in fact, it requires the designer to have a general composition and slowly put it together like a jigsaw puzzle. In this process, problems are gradually discovered and overcome. But if this puzzle is done manually by one person, it must be a huge amount of work, and only part of it lacks integrity, and then put it together again, such planning and design lacks integrity. In contrast, computer-aided landscape planning and design can simulate the design drawings in a three-dimensional way, so as to see whether each part matches properly on the whole, so as to constantly modify and improve the design [1]. Computer can not only guide design, but also play a great role in location selection, ecological assistance and other aspects.
2. Introduction to relevant core technologies

2.1. Landscape architecture planning major with a high degree of intersection between COMPUTER aided design and disciplines

For the design industry, the emergence of computer-aided design technology greatly promoted its modernization development, not only improved the efficiency and precision of design drawing, but also led to the ketchup 3d drawing era. 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. Especially the application of virtual reality technology in landscape architecture planning and design has greatly improved the scientific nature and rationality of the design. Landscape architecture planning and design have long intercommunicated with many other related disciplines, such as architecture, urban planning, computer science, ecology, environmental science, art, economics and law. Therefore, this industry involves a wide range of natural resource protection, urban square, land use and development, etc., as well as the design and research of a small garden and other projects, which put forward different requirements for computer-aided landscape planning and design. Landscape architecture planning and design professional range is so wide, and can assist the specific rules: cross design of computer aided technology is also more, such as geographic information systems, 3 d model building technology, ecological aided design technology and virtual reality technology, the most basic to auxiliary landscape architecture planning and design of computer aided design technology included. Among them, aiming at the traditional drawing tools such as Auto CAD, the GEOGRAPHIC information system can be expanded to assist the analysis and entry of information and drawing, excluding the limitation of geographic information data [2-4]. Based on the analysis of a variety of ecological platform, ecological aided design technology from various angles, such as light, heat, wind, etc., through the analysis of all kinds of meteorological data, this paper is suitable for the method of landscape architecture planning and design: to build the 3d model is combined with Bm and the method of parametric design, starting from the 3 d entity model, the 3 d model to build the information form change and extend storage capacity. At the same time, the 3 d model building for ecological aided design and geographic information system provides the basic entity model, cooperative dynamic design and structure design, from the perspective of computer-aided design technology promoted the development of modern landscape architecture specialty: virtual reality technology is through the computer technology to the environment simulation, simulation, and use of special equipment for user interactions with the simulation environment. This technology can help landscape architects to break through the "flat profile" two-dimensional scheme design mode, so as to put the point of view in a simulated real space environment for the most intuitive design, and finally make the scheme design more perfect. In a word, as the link between landscape architecture planning and design major and other disciplines, computer-aided design technology, whose application makes the knowledge of thermal and humid environment, geographic information system, fluid mechanics and other professional disciplines serve landscape architecture planning and design more effectively.

![Figure 1. 3D modeling technology under information technology.](image-url)
2.2. Evolution of thinking and expression of landscape planning and design

(1) Language stage
Language and writing are the main forms used to convey engineering practices and designers' design intentions in the traditional landscape design and construction process. Over thousands of years, many excellent gardens have been built in this way. As far as the modern society is concerned, it has become a kind of history to design and build gardens solely by means of language and writing. Because landscape architecture design has certain complexity in time and space, plus for today's society with advanced science and technology, it is not accurate to simply rely on language and text to describe and express landscape architecture design. In short, from the point of view of both western and Eastern landscape design, some existing classical gardens have been dependent on the transmission of language, which makes their design thinking and schemes less changeable.

(2) Freehand drawing stage
As a basic form of landscape architect's design concept and scheme expression, freehand drawing is mainly divided into two types: sketch and normal drawing. One of the most important ways to inspire design is the hand-drawn sketch, in which the designer connects many of his or her casual ideas with drawing pens to build the prototype of the garden design scheme. As a basic skill of current landscape designers, hand-drawn sketches will not be completely replaced by other ways, and they occupy an important position in the field of landscape planning and design with their unique charm.

(3) Sand table model stage
A certain Angle rendering drawings to garden shone, at the same time, it can record the inspiration of the designer, and sand table model, can let a person feel after completion of the landscape effect, it is an inevitable outcome in the development of landscape architecture design, not only can fully express the designer's inspiration and ideas, let a person close, after completion of the multiple angles of view garden effect, but also to help designers to find errors in hand drawing, assist them in landscape shape, size, and fiber and structure of the judgment [5]. However, the sand table model cannot achieve the "immersive" experience of the atmosphere of the scene.

(4) Computer-aided design stage
Computer aided design stage is along with the maturity of the computer technology and multimedia technology, the arrival of the first set of computer graphics system () in the 1950s began in the United States, computer aided design technology had wide "extensive applications, and design industry in China began to popularize and apply the technology is in the 1990s, such as "print, the emergence of Chinese printing, etc. At the same time, various colleges and universities also gradually began to set up computer-aided design courses, so as to meet the needs of market development. For example, courses such as Computer-aided Planning and Design, Computer-aided Design for Architectural Engineering and Design Software and Application are offered by Nanjing Forestry University. All these show that computer-aided landscape architecture planning and design has become the trend in the digital era.

Table 1. The proportion of landscape planning in Jiangxi province using various methods

| Mode      | Number of people | percentage |
|-----------|------------------|------------|
| Artificial| 15000            | 15%        |
| Sand table| 35000            | 35%        |
| Computer  | 50000            | 50%        |

2.3. Advantages of computer-aided landscape planning and design
(1) Computer-aided landscape planning and design has broadened the expression of landscape architecture design
The ways of landscape architecture design are more diversified under the computer-aided landscape architecture planning and design. The computer aided software has a very powerful function,
which can not only produce section diagram, square meter diagram and color diagram, but also realize the production of virtual reality scene and animation tour. These technologies can bring visual enjoyment and design experience to the audience.

(2) Computer-aided landscape architecture planning and design is more scientific

According to the needs of landscape architecture design, computer-aided software can draw more scientific and accurate graphics without the help of tools such as ruler and pen. Using modeling software, landscape architecture planning and design can also be realized. The 3d model scene is generated and then the virtual reality scene or landscape animation effect is realized. At the same time, computer-aided landscape planning and design can also help designers improve their design scheme, promote their contrast and feeling of space, shape, material and color, so as to inspire their new design inspiration and concept. All these greatly promote the scientific and rational landscape planning and design, and also improve the standardization of construction drawing drawing.

(3) Computer-aided landscape architecture planning and design has greatly improved the working efficiency of designers

Before, in landscape architecture design landscape planning designer needs a large number of survey and mapping work, and the emergence of computer aided technology greatly reduce their workload, using this technology, designers can not only faster rendering drawings, but also can carry on the local modifications to the drawings, thus greatly improving the work efficiency.

2.4. Computer-aided landscape design software

At present, the computer aided design software application in landscape planning and design industry mainly has the following categories: first, "two-dimensional" software design, this kind of software is mainly represented by AutoCAD, because AutoCAD modeling ability is weak, and not flexible coordinate system, its itself is the three-dimensional system cannot play out, and gradually become the bottleneck of designers in design. After dozens of versions of the evolution of AutoCAD, so far has made great progress, and gradually become the "leader" in computer-aided design software. However, the kernel of the software has never been modified, so that the software itself has not been finalized. As the basic software of computer aided design, AutoCAD is often used to make two dimensional images in landscape architecture design. In this way, not only the profile image of landscape architecture can be accurately and clearly drawn, but also the ground area and other data can be accurately measured, so as to achieve rapid modification of the image, reduce the labor intensity of the designer. At the same time, based on the AutoCAD platform, many foreign software companies have carried out secondary development to design more professional design software, such as "Jiayuan", Tianzheng software and so on. Second, 3d modeling software [6].

The goal of this kind of software development is to achieve 3D modeling, so it pays attention to the improvement of modeling ability in design and development. CINEMA4D, 3DSMAX, SketchUp, Maya, Rhino and other software are representative of 3d modeling software. Some of the modeling software also has the ability to render directly because it has a renderer installed. In this category of software, as a modeling software commonly used in architectural design and landscape architecture design industry, 3DSMAX modeling method is only suitable for the presentation of the scheme, but not suitable for assisting designers with scheme conception or creative conception. In addition, 3DSMAX modeling software also plays an important role in the production of traditional virtual reality scenes and 3D animation roaming. Rhino is mainly used in industrial modeling, because of its large surface modeling ability, it is not very practical in the landscape architecture design industry. Maya's modeling process is relatively complex, which is mainly used in 3d production and animation of film and television. Third, software with strong rendering function, such as V-Ray, Braz, MentalRay, etc., are single renderers, but they do not have 3D modeling function, but have strong rendering capability. This type of software is designed to work with 3D modeling software to achieve "photo level" rendering effects. This kind of software is mainly used for rendering commercial renderings.
Fourth, late editing software, such as Photoshop, Painier, Mustrator and other TWO-DIMENSIONAL editing software as well as three-dimensional animation editing software such as Combustion and AfterEffects. Because different software has different advantages and disadvantages, therefore, in the actual production process, the software must be used together, so that Give full play to their respective advantages and make up for their deficiencies. According to 3d modeling software, such as 3DSMAX and Sketch, 3d animation editing software can edit the animation output in the later stage. Among them, in 3D animation editing software, the Combustion. Aftereffects is a representative software, which is also one of the important ways of computer-assisted performance at present. The fifth one is virtual reality software, which will be analyzed and studied in the following chapters in this study.

![Image](image_url)

**Figure 2.** Renderings of landscape architecture design aided by computer.

### 3. Conclusion

With the development of science and technology, computer-aided landscape design will only be more and more convenient, the two are interrelated. Also promoted their own development, the computer covers a wide range, with the assistance of the computer, more perfect landscape planning scheme.

### References

[1] Feng Xiao, Qi Shuxiang, Cheng Wenyu. Application of computer aided construction technology in the teaching of landscape architecture planning and design [J]. China forestry education, 2016, (6) : 65-69

[2] Hu Baiyun. Application of computer aided strategy in landscape architecture design [J]. Daguan, 2020 (01): 56-57

[3] Lian Yajian. Discussion on computer aided landscape planning and design strategy [J]. Modern horticulture, 2019 (20): 109-110

[4] Wang Fangfang. Research on computer aided landscape planning and design strategy [D]. Hubei University of technology, 2017

[5] Feng Xiao, Cai Linghao, Wang Wentao. Sandbox: Landscape design, 2017,5 (02): 42-55 an operation platform for landscape planning and design based on computer aided construction and augmented reality technology [J]. Landscape design, 2017,5 (02): 42-55

[6] Shi Hui. Discussion on computer aided landscape planning and design strategy [J]. Agriculture and technology, 2016,36 (22): 194.