Application of 3D Modeling Software in Landscape Planning and Design

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Abstract

To improve the performance of landscape planning and design, this paper expatiates the combination of garden design and three-dimensional software, which is through computer-aided analysis and design with the interactive communication, space entities and graphic graphics unified design method. This paper introduces the design advantages of multi-angle spatial distribution, comprehensive function, artistic requirements and environmental conditions. In addition, we compare the difference between two-dimensional graphic design and three-dimensional space design in analysis and modification. We give the development prospects of that the two-dimensional drawings into the three-dimensional space.

Keywords: 3D Modeling Software, Landscape planning and design, 3D auxiliary design.

1. INTRODUCTION

Computers have been applied to all aspects of social life, meanwhile computer-aided design technology used in garden design also has a long time. However, most technologies are limited to two-dimensional graphics production. Three-dimensional software is mostly used in the design after the implementation of the effect map to participate in the production (Bauer et al., 2013). The current design is still in the two-dimensional plane design of three-dimensional space entity. However, with the continuous progress of computer technology, the development of three-dimensional software is mature, and the current technical conditions can already make the design from the two-dimensional drawings into the three-dimensional space. The development of three-dimensional software can meet the requirements of the design process, and the three-dimensional software in the landscape is designed to participate in the process of supporting the preliminary exploration (Flaxman, 2002). As shown in Figure 1, 3D modeling software is used in landscape planning and design.
Garden has been a long development, which has become a human civilization. Meanwhile life and spiritual emotions are inseparable from the part of the space, and the scope of the garden has long been beyond the narrow sense of the courtyard. In addition, other areas involve all aspects of human life (Yu et al., 2012). Since the second half of the 19th century, American gardening master has planned New York Central Park. To expand the scope of the city as a whole green, it gradually forms an independent professional and has a specific connotation of professional disciplines, and marks the establishment of modern landscape garden (Lee, 2012). Generally speaking, the garden is in a certain area with the use of engineering and artistic means, which is through the whole geographical water, plant planting and construction of the way to create a landscape for people to watch and recreation. 3D is also known as 3D (three-dimensional), that is, three-dimensional graphics (Tang et al., 2011). The computer screen is two-dimensional in the plane, and the reason why people can enjoy the real three-dimensional image is due to the human eye to produce visual illusion. And three-dimensional production is used to create a virtual world in the computer, while designers in this virtual three-dimensional world are in accordance with the shape of the object to shape the size of the model and the scene according to the requirements of the model set various attribute parameters (Counsell et al., 2009). Production of various models or scenes of the software is three-dimensional production software. Because of its accuracy, authenticity and infinite operability, it has been widely used in medicine, education, military, entertainment and many other areas.

2. STRUCTURE OVERVIEW OF TRADITIONAL GARDEN DESIGN AND EXISTING PROBLEMS

![Overview of Traditional Garden Design and Existing Problems](image)

Figure 2. Problems in the Design of Traditional Gardens

China is a very long history of the country, whether it is in the garden plant breeding, cultivation, or in the creation of garden boutique has great characteristics. The world has a significant impact, which is known as the "World Garden Mother". It is one of the world's three major garden births (West Asia, Greece and China). However for a variety of reasons, China's garden education and discipline development started are late in many ways, so we should fully understand and learn the worlds advanced design ideas and design methods (Huang and Zhan, 2013). The traditional design means to apply the use of hand-painted way to draw the design drawings, construction plans, renderings, elevation, etc. Because the CAD vector graphics software has many advantages, such as its standardization, efficiency and many other advantages, most people have been drawing in the design drawings, construction drawings using CAD software for mapping, which has widely used in a variety of design industries (Bishop et al., 2005). However, CAD is mainly for two-dimensional graphic design of the software, so there are still plane mapping limitations brought about by the problem in some areas. The details of problems in the design of traditional gardens are given in Figure 2.

2.1 The spatial proportions are not clear

Because it is in the plane through the plane composition of the three-dimensional design of the landscape, it is often caused in the design layout to ignore the relationship between the amount of space (Yin et al., 2011). Although the plane is very beautiful, some beginners will design a 10m long table, tens of meters wide path and other jokes. As shown in Figure 3, the space ratio is not clear in the model.
2.2 Design image is not like

Because of the graphic design, three-dimensional image is mostly in the brain to form a blurred image, which is not to mention a comprehensive consideration of its objects. As the brain is not the physical image of the depth in the perspective of painting renderings, which is only in accordance with the beautiful and beautiful to draw, and it is simply out of their position in the graphic design relationship (Feingersh et al., 2007). It will result in the graphic design like a good match, in the facade or construction but found that very uncoordinated or even impossible to achieve the situation.

2.3 Inconvenient to show to non-professionals such as owners

Considering that there is no real integrity of the formation of space entities, the traditional way is only by a hand drawing to show. And due to the limitations of hand-painted way of their own characteristics, it results that most of the view can only show part of the view, and need to spend a lot of time and energy. When the design changes a little, these original drawings will be completely invalid, and all must be redraw.

3. THE ADVANTAGES OF 3D MODELING SOFTWARE

In the traditional landscape design, the landscape designer completely expresses the design concept through hand drawing, which is time-consuming and difficult to modify. With the continuous development of computer technology, the three-dimensional software is mature, and the process of landscape design can be combined with three-dimensional software. By making computer-aided analysis, the corresponding design and modification have many advantages.

3.1 Accurately determine the spatial proportions by 3D modeling

In the three-dimensional space to establish a virtual scene and in the scene of the design, you can accurately and intuitively see the design of the object and the proportion of the environment is appropriate. At a glance, it can be based on the human body model for reference, which is compared with the rationality of the volume and even accurate scale settings (Qiao et al., 2009). This will allow the design in the rough without considering the relationship between the design of the full exposed, so the design is more accurate to achieve the basic requirements of the garden design.

3.2 Image of concrete objects

The graphic design used to determine the design position of the object and the three-dimensional modeling use to determine the object's spatial three-dimensional image are the three-dimensional auxiliary designs of the key advantages for the landscape, landscape, plant and building. And it is the most important and indispensable elements due to its own characteristics of the limitations. Three-dimensional design can be a good solution to this problem. The three-dimensional modeling can determine the specific shape of the object space, and can
immediately see with the environment color, shape and other collocation is harmonious, which can also be specific changes to avoid the plane and three-dimensional independent and conflict.

3.3 View the analysis from the perspective of real visitors

Whether it is garden design, or environmental design, its fundamental purpose is to serve people, the design should first consider the human feelings, from the specific user's design must not be a successful design, and the plane design point of view is flat, Not from the perspective of visitors to think about the problem, this design method is often caused by the situation, such as a Phoenix pattern for the overall layout, the overall conception is the Phoenix, and the Phoenix in the name of the square, allows visitors to visit after the Phoenix can not find where In the three-dimensional scene, the designer can design in the view of visitors to observe, to see whether the design of the landscape and thinking in the same effect, the level of the location of the visitors have an inconvenient effect, the design ideas from the perspective of visitors can you understand that this design is not only the improvement of design methods and optimization, more important is to change the design concept from the audience, empty to the design concept, so as to meet the "comfortable and beautiful needs" design.

Figure 4. Intuitive display

4. 3D AUXILIARY DESIGN PROCESS

In the concrete practice of garden three-dimensional design, the design process of different design requirements is different, but there are basically the following steps:

4.1 Survey and analysis of basic information

The main task is to understand the terrain, vegetation and other conditions, which can be a comprehensive understanding of the collection of drawings and other materials to understand the terrain features, analysis of plant climatic conditions, soil type and clear design requirements, so that the design is based on the actual terrain geomorphology and other conditions. The planning or arrangement of the whole garden's land and the conception of the conception is an exploratory approach to produce a very rough framework. Program design will often make a number of programs, and then comprehensive comparative analysis ultimately produce a best program.

4.2 CAD plane preliminary design

In the CAD software environment for the initial design of the plane, the garden design is mainly a plan, but it is the three-dimensional scene through the projection to the plan to draw the way, so this stage design is not just the design terrain, architecture, but also to consider the three-dimensional scene. CAD is widely used in the design software, and almost all of the three-dimensional softwares are compatible with dwg format file. You can
import such as "3D Studio Max", "SketchUp (sketch master)" and other softwares into the three-dimensional environment.

### 4.3 Two-dimensional and three-dimensional analysis

By observing the virtual landscape in the 3D scene, you can visually observe the effects of the landscape and analyze the spatial distribution relationships in multiple ways. And then the needs of integrated functions, artistic requirements and environmental conditions and other factors, and gradually design changes. In this process, the drawings change the workload largely (Xu et al., 2008). If it is the original drawings, there will be a lot of trouble, and every point of change means the drawings redraw. Thus the advantages of computer graphics are very obvious. As shown in Figure 5, the combination of two-dimensional and three-dimensional is shown in details.

![Figure 5. Combination of two-dimensional and three-dimensional](image)

### 4.4 Make detailed changes to the design plan and refine the 3D scene

In order to emphasize the importance of analysis and analyze the main points of improvement, we need to check after analysis obtains the improvement ideas. And then we modify the plane map and three-dimensional space, such a step by step analysis, improved step by step, and obtained through analysis of the design of virtual reality. The real garden design scene is given as shown in Figure 6.

![Figure 6. Real garden design scene](image)
Due to the establishment of three-dimensional scene, designers have been fully aware of the design of the landscape environment, and the establishment of three-dimensional model also makes the facade size basically clearly. Thus the vertical design, planting design, vertical profile and hanging in the column, the building couples are only part of the garden calligraphy. In the garden of the inscriptions, plaque couplets, poetry and painting, the garden landscape wonderful embellishments have the value of cultural relics appreciation with quaint beauty.

5. CONCLUSIONS

On the Chinese classical gardens and calligraphy, the most representative of its artistic level is undoubtedly the creation of mood. The creation of this mood comes from the vast nature of Chinese classical literature, art, philosophy and religion. Chinese classical garden art is the magnificent mountains and rivers of the motherland, beautiful country modeled, and it is not only entrusted with the longing for the pursuit of nature, but also contains the praise of the land of China. Their high artistic achievements show the beauty is still what we are pursuing, garden with Chinese literature, painting and calligraphy and other art in real life. The law is natural and higher than nature, and the reason why classical gardens are attractive, it is because of the beautiful natural landscape, man-made landscape, more importantly, its deep historical trajectory and humanistic color. Therefore, in order to understand the Chinese classical gardens, planning and design of a more perfect garden, you need to have a high cultural and artistic accomplishment, gardening art practice, but also enriched the aesthetic connotation of traditional culture.

REFERENCES