

Exploration and Innovation on Interactive Campus Landscape Design

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Abstract: With the rapid economic development, ordinary campus architecture design fails to meet the needs of the students, and it is extremely important to provide leisure facility for students outside the classroom in terms of the way to construct a more comfortable landscape architecture outside the teaching building rather than for merely visual feeling. In the university, students are not only study-oriented, and there is more space for development in the space design for activities other than learning. Therefore, the research is conducted based on "campus landscape" and "interactive design" to explore the interactive landscape design in colleges and universities and interactive landscape design is studied in the concrete plans through literature search, case studies, summary and other research methods to apply it into campus landscape design, and to interpret realistic significance of the interactive landscape design in the process of research.

1. Definition of Basic Concepts

1.1 Landscape Design

Generally speaking, landscape design refers to the design method to develop the space environment and cultural environment suitable to the local characteristics by changing the ground paving, vegetation design, path planning and other means in a certain space with combination with the unique cultural characteristics around the site. Landscape design can make the environment to be endowed with more values in aesthetic appreciation, and is capable of satisfying people's daily utilization in the premise of ensuring sustainable development.

1.2 Interactive Design

The earliest interaction design was proposed by Bill Moggridge in 1984[1]. At the beginning of the concept, interaction design was defined as "designing interactive products that support people's daily work and life" [2]. With the rapid growth of the economy, especially the rapid growth of industrialization after the industrial revolution, people's definition for interaction design is changing constantly. In China, interaction design mainly exists in cyberspace. The emergence of electronic products and the introduction of foreign concepts of interaction design make domestic interaction design to transform from "web page interaction design". After decades of development, interaction design gradually permeates into other fields. The significance of interaction design mainly lies in the fact that it can optimize the interaction between people and design results, or the way of use to a certain extent[10].

Generally speaking, interaction design contains two levels of content, the more basic level refers to "behavioral interaction", the deeper level is "spiritual interaction". "Behavioral interaction" means that in a specific designed environment, people's behaviors and actions can interact with the environment or the relationship between people and the environment. In this activity, human beings act as subjects to realize conscious subjective activities, whose purpose is to transmit information and obtain functions. Behavioral interaction is often seen in the setting of various devices. Dune 4.0 is a relatively transmitted interactive landscape device. It can emit different light according to the activity state trend and sound movement of people around, so as to create different light environment according to the number of people, intensity and noise degree.

"Spiritual interaction" is more about spiritual resonance. It usually refers to that people have certain thoughts and feelings subjectively because of certain things, such as light, atmosphere,

smell, etc., so as to reach a state of spiritual synchronization or resonance. This kind of resonance can be the reflection of some kind of image or meaning of the main subject to the specific thing, also can be a kind of feeling to the sitting room. BIG's Copenhagen waste incineration power station is a design of spiritual interaction. With the introduction of interactive design ideas, the power plant was given a new meaning, which incorporated the function of a ski resort, bringing human activities into an industrial building, making the building more than just a cold workshop. The most expressive design of spiritual interaction is the giant chimney in the project. The chimney is 100 meters high and 30 meters in diameter. The design enables the chimney to release smoke into the air when the emission reaches a certain amount, forming a 30m big smoke ring. At night, the heat tracking lamp will be used for laser emission, which can not only provide a visual art for the city, but also serve as a metering device to show the consumed energy [3].

2. Theoretical Basis of Interactive Landscape Design

2.1 Landscape Interaction Theory

Design is a way of practice, and practice is an objective material activity of human initiative to transform the world. Both landscape design and construction have initiative. By using this way of thinking, people can form a close interactive relationship with landscape. This interactive relationship is divided into two aspects: First, users can directly interact with the landscape through their own actions. Designers will set up devices that can directly interact with each other in landscape design, such as jumping boards and slides, to participate in interaction through daily behaviors and movements. Second, people can complete or reflect on the landscape through imagination and the "spiritual resonance" mentioned above. The steps and rockery in Chinese classical gardens are interactive landscape designs that make use of subjective imagination. "Despite in the city, it is like in a mountain forest" [5].

2.2 User Psychology Based Theory

User psychology is a discipline produced by the intervention of psychology after the creation of interaction design. It changes and advances its design through the analysis of users' psychology and the statistics of their behavior when they use it. This will form a new design pattern that pays more attention to the user experience, which is generally called user experience design [8]. With the advent of this design, the user experience becomes the goal. Therefore, at the beginning of the design, user experience design often starts with a survey of users, and through the analysis of user needs, the design is targeted to achieve accurate design. When interacting with the design results or using them, the psychological activities of users change a lot. Because the result of landscape design is a usable space, so the "user" of landscape design will be in the process of designing products all the time, so it is very important to investigate the psychology of users.

3. College Campus and Interactive Landscape Design

3.1 The Interactive Interaction between the Campus Building Community

The word "architecture" initially appeared in western countries. At the beginning of its appearance, architecture included design and construction. With the intersection of disciplines, it gradually formed a design element of landscape architecture in landscape design. As a branch of landscape design, the existence of landscape architecture can become an ornament in landscape design, and the relationship between building communities can better play the role of stitching landscape and functional architecture. Pavilions, in Chinese classical garden design, for example, the landscape architecture as a part of the landscape, provide the scenic lookout for people, and the landscape and pavilions in other places will be the scenery to be viewed. In the whole building community that is made up of pavilions, it will be scenic lookout, which will produce visual interaction.

The interactive design of building community is more related to people's use. The building is no

longer a cold monomer structure, but through the design of some node space, the whole building can not only echo with the site, but also allow students to engage in some activities, interact with the building. At the same time, the buildings will interact with each other because of the students' activities. Taking Building D and Building C of School of Architecture and Urban Planning of Tongji University for example, as activities are held in the sunken square below C, the gray space facing Building D towards Building C becomes the stand for performance, and interaction between buildings can occur.

3.2 The Interactive Relationship between the Campus Road System

As the only place for students, teachers, the road system plays a very important role in the organization of the flow of people and the shaping of the landscape. In addition to organizing the flow of people and the relationship with the landscape, the road system itself can also produce interactive relationships. The interaction between road systems means that each system can exert certain interactive influence on other road systems through the effective combination of human behavior and psychology with landscape. Different road systems have different spatial perceptions and atmospheres. The existence of other road systems is to better highlight the distinctive characteristics of a certain road system. For example, a quiet path can be used to highlight the tranquility of the path by means of distortions in the plane and elevation difference in the vertical direction that are significantly different from the main road.

The participation of interactive design ideas enables designers to better think about the actual functions of different road systems and reduce the setup of repetitive road systems to a certain extent. Some road designs were made only from the plane with low efficiency and so on. Some roads were left without anybody to care for because of the lack of consideration from the perspective of human behavior, as a result, some landscape design is difficult to reach. There are also some unique road design systems, however, human activities or the impact on environment and interaction were not taken into consideration, which leads to monotony and related activity experience failed to be conducted. The introduction of the idea of interaction design can reduce the occurrence of this situation to a certain extent, and create a more reasonable and effective road system and the interactive relationship between systems.

3.3 Interaction Design of Campus Landscape Nodes

As a state between building community and road system, landscape node is very important for landscape design. On the one hand, the landscape node provides a gathering place for people in the road system, and on the other hand, it also becomes a point element, interacting with the surrounding environment from a sensory perspective. The interactive design of landscape nodes is to provide people with the possibility of interacting with the surrounding environment according to people's behavior through reasonable placement of the locations.

As one of the nodes of landscape, water body can improve the quality of landscape. In the modern campus, in addition to learning, there are many other extracurricular activities, and the environment shaping of extracurricular activities has increasingly become a factor of concern. In shaping the landscape, water often becomes the punchline. Because of its plasticity, water can affect the overall effect of the environment. It can not only connect the landscape, but also serves as the leader of the landscape, each landscape is connected through water. The existence of water body provides vitality for landscape. Only by reasonable and appropriate treatment of water body, can the relationship between landscape, human and environment be coordinated.

Water landscapes can also improve the environment. As a rare static space in modern cities, the landscape in university campus, especially the water body, plays an extremely important ecological role. In today's high-density urban development, the water body can play a role in improving the campus microclimate. In addition, water also plays a certain role in noise reduction, reducing the high-frequency noise heard by human ears through the masking effect of sound[7].

The generation of landscape nodes is also inseparable from the rational planning of vegetation. A enclosed lawn often plays the role of collecting and distributing people and providing a place for rest. High vegetation on one side can often guide people's sight to the other side. Through the

design of vegetation, it can help people have more visual interaction with other surrounding nodes, and then it can become spiritual interaction.

3.4 The Interactive Experience of Campus Landscape Facilities

For the definition of landscape facilities, everyone has a different definition method. This paper believes that landscape and facilities are two kinds of things, landscape and facilities should be integrated, so that facilities and landscape should exist as a whole and to echo the campus environment. In landscape design, landscape facilities are an important factor, and the service objects of landscape and facilities are people. As a link and node, landscape facilities assist people to participate in the landscape environment. Different landscape facilities will provide node spaces or links with specific styles in different environments[4].

Interaction design of campus landscape facilities is based on the original landscape facilities. Based on interdisciplinary connectivity and the use of user psychology knowledge, interaction design ideas and human experience were regarded as the starting point of landscape design. Through the application of interaction design ideas, as well as the use needs and methods of students and staff, the design results that are the most appropriate and in line with the requirements were analyzed, so as to provide students and staff with more friendly and practical design products.

4. Research on Interactive Campus Landscape Design Methods

4.1 Interaction between Users and Landscape Design Sites [2]

4.1.1 Behavioral Interactions

Behavioral interaction is the most straightforward way of interaction, which is to interact with the landscape through behavior. The Dune 4.0 device mentioned above is a behavioral interaction. People interact with the campus environment through their own way of behavior. In the landscape design of university campus, the activities of students and staff in the campus and the atmosphere needed for the activities should be fully considered, and the behavior mode of activities of students and staff should be guided.

There are many activities on college campuses. Due to the existence of various associations in colleges and universities, different associations can often be seen on campus to carry out activities. From the perspective of behavior, it is endowed with richness. Only a little change is needed to transform the existing landscape environment and landscape facilities according to the needs of different activities, which can well promote the interaction between people and landscape.

4.1.2 Sensory Interaction

Sensory interaction is the most basic interaction mode in campus landscape design. When students and faculty members walk to and from school on campus, the scenes they see and the smells they smell are all sensory interactions. Therefore, some novel landscape design, such as sound landscape design, can be shaped according to people's senses. The interaction of sound can be divided into psychological interaction and participatory interaction. Psychological interaction refers to imagination through auditory sense due to the subjective initiative of the human brain. Participatory interaction is an interactive behavior that changes the original voice through one's own behavior and actions on the basis of psychological interaction, so as to participate in the experience.

4.1.3 Emotional and Cultural Interaction

The interaction of emotional culture is also a very important link in interactive landscape design. For campus, there must be unique cultural characteristics and cultural accumulation in the place, therefore, in the design of campus landscape, the local cultural characteristics and cultural background should be extracted, and the abstracted elements should be combined with design. As a result, students and faculty can also experience and understand the local cultural background through interaction with landscape[9].

4.2 The Interaction between Landscape Designers and the Needs of Users

4.2.1 Students' Requirements on Landscape Design

As the main body in college life, students will spend most of the day on campus. The existence of campus landscape is not only a viewing space, but also a living space and entertainment space. Therefore, for the campus landscape design, both the requirements on visual beauty and extracurricular activities for students should be satisfied.

First of all, the design of campus landscape should be made with efforts to identify the needs of students through the investigation of the existing activities of students in the site. For example, for some community activities that need a specific site, such as skateboarding and dancing, whether the activity facilities can be combined with the landscape, so that the activity can also become a part of the landscape. Instead of directly referring to other cases, other good interactive landscape design such as rural landscape design and zoo landscape design should be directly copied and grafted. The second is the response to the local culture. Most of the students living in the university are not local students, so how to make students to feel the local culture and to integrate themselves into the local environment is also very important. Therefore, campus landscape design should also try to interact with the behavior of students and landscape, so that students can better understand the local culture [6].

4.2.2 The Requirements of Teaching Staffs on Landscape Design

As the object in college life and since the main living space of the the teaching staffs is not in the college, the interaction with the environment should be more direct with more sensory interaction, so that the teaching staffs can have a space to relax after working.

5. Conclusion

In the modern era of rapid economic development, people's yearning for a better life is getting stronger and stronger, and colleges and universities are no longer only places for teaching. Landscape design on campus has gradually become an indispensable part of campus environment design. The formation and introduction of interaction design thinking can better help designers to meet the needs of users and create a more beautiful campus environment.

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