Application of Architectural Programming in Architectural Design

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ABSTRACT: Architectural programming is the research work of the project's overall construction upon approval of the comprehensive planning and before the architectural design. This research work can effectively improve the scientificity of the project decisions, guarantee the scientific and orderly implementation of the project, and thus, promote its sustainable development, and sustain the overall balance of economic benefit, environment benefit and social benefit. This article takes the building of the School of Architecture of Tsinghua University as an example and plans to employ the architectural programming in the preliminary planning for the renovation design of the courtyard space, hoping to provide some guidance to the renovation design of the building.

1. Introduction

Architectural planning is very urgent for the development of architectural design and real estate industry. However, compared with the maturity of urban planning and architectural design, it is only a new subject field. In Europe and the United States, the study of architectural planning started slightly earlier, and it has attracted much attention in the field of architectural design and engineering management. In this period of rapid development since China's reform and opening up, architectural planning has gradually attracted people's attention. In recent years, with the rapid development of science and technology and the continuous urbanization, the field of architecture has become more extensive. There has been a change from the initial construction activities to the design of architectural design, landscape design, landscape environment design and so on[1].In this paper, virtual cases will be used to simulate the application of architectural planning, hoping to get the principle of universal application

2.Research Background and Expected Research Results:

School of Architecture, Tsinghua University was founded in 1946 and has a development history of more than 60 years. As a bellwether of architecture schools or departments in universities nationwide, it possesses a strong influence. However, the existing building of the School of Architecture is old and the building spaces can no longer meet the demands for modern teaching[2]. This article plans to employ the method of architectural programming to provide a research-type renovation plan for the building. It will conduct a comprehensive investigation of the building, determine the preliminary orientation and overall spatial design based on the investigation results, and then propose a rather complete renovation plan.

The building of the School of Architecture was built a long time ago, and its space can no longer cope with the demand of modern teaching and lacks spaces for communication and rest, not to mention the small student design studio and teachers' design room which have affected the teaching quality. The building also has a poor relationship with the surrounding environment, which is mainly manifested by the insufficient parking spaces, arbitrary parking of bicycles, unutilized internal courtyard and the dull pattern of the south facade[3]. The task for our ME (Master of Engineering) curriculum design is to renovate the building. We are allowed to expand the internal courtyard and renovate the original pattern of the facades without tampering the basic structure of the building; or re-determine the functional zones around the building, such as parking spaces for cars and bicycles. Our group didn't rush to the renovation plan design when we got the task. Instead, we conducted block analysis and block positioning of the original building based on the programming method taught by

Professor Zhuang Weimin, and we formulated step illustrations of the planning and research scope using graphic method to determine the research direction and predict the general research results we could achieve.

The predicted research results of us include: fully utilize the courtyard to build modernized teaching spaces matching with the building's characteristics[4]; add spaces for communication, and rest; optimize the existing building space and re-allocate the resources reasonably; re-position the relationship between the building and the surrounding environment; establish routes for pedestrian flow and traffic flow (bicycles, and cars) and set parking spaces. Besides, renovate the three facades, especially the south facade without damaging the structures to break the current homogeneity of the facade pattern, and bring out the personalized design characteristics of the School of Architecture[5].

3. Basis for Planning and Status Survey

Refer to and conduct field investigations of the School of Architecture and School of Design of peer universities.

We referred to and studied designs of teaching buildings in the College of Architecture and Urban Planning of Tongji University, School of Architecture of Central Academy of Fine Arts, Academy of Arts & Design of Tsinghua University, School of Architecture of Jinan University and School of Architecture and Planning of Shandong University (I conducted field investigations of all these 5 schools), and summarized a list of essential spaces of design colleges (mainly schools of architecture): a. design studio, b. exhibition hall, c. lecture hall, d. art studio, e. model room, f. rest and communication space, g. networked study room and h. faculty's office.

3.1. Results of field investigation:

A．The Spirit of Space: apart from meeting normal teaching functions, the architectural space of these peer colleges pays great attention to the spirit of space. For instance, a white piano is placed in the semi-underground hall of Tongji University, appearing a warm and romantic style; the irregular staircase from the first floor to the second floor of the School of Architecture of CAFA just inspire students to create something; the circular arc and full transparency design of the library, together with creative window opening mode in the atrium have brought out smart elegant space; the atrium designs of both the School of architecture of Jinan University, and the School of Architecture and Planning of Shandong Architectural University also have their own taste, paying attention to the design of interest space, and fully guaranteeing the space of popularity and spirituality. In addition, the above five institutes all attach great importance to the space of exchanges and rest. Except for the construction of Jinan University, all the other four have set up coffee bars. These bars not only bring rental income to the college, more importantly, create warm space for exchanges and rest, so that teachers and students can relax physically and mentally and communicate face to face after work and study. In addition, they also bring enough popularity to the Schools of Architecture. In addition to the coffee bars, each School of Architecture also has a lot of scattered small exchange space, which not only facilitates students to communicate nearby, but also guarantees certain privacy by design of humanization.

B. Function zoning is clear while the teaching area and office area are relatively independent: the above departments, thanks to their newly built buildings, have clear functional zones and distinct dividing between movement and rest. Public areas, teaching areas, and office areas are relatively separate and don't have any negative impact on each other, but still with a certain connection.

C. Decoration and ornament of features: for example, the dry hanging on the facade of Academy of Arts & Design, Tsinghua University, has a beige stone of a certain texture, which fully demonstrates the modern atmosphere; while the facade of the School of Architecture of CAFA is a gray one of high-grade gray, which is different from the others, while with the unique characteristic and color of the design institutes. The interior decoration is unified but there are abundant changes in detail. For example, the interior floor of Academy of Arts & Design, Tsinghua University, has three kinds of materials: ceramic tile, board and iron sheet (the corridor part between the buildings). This

seemingly insignificant material change, however, will bring a surprise or a different psychological feeling to students or visitors, thanks to the subtle spirit in details.

D. The surrounding environment of the building is well processed, with greening, empty yard, and bicycle alignment all in place.

4. Field Investigation of the Building Renovation

We first conducted a comprehensive investigation of the status quo of the School of Architecture to find the mode and shortages of the current building:

Relationship between the building of School of Architecture and the surrounding environment: This building was built earlier than all other surrounding buildings and hence, its style and the facades are not as new and up-to-date as other buildings (such as the Academy of Arts & Design on the east, the School of Economics and Management on the west and the building of School of Law on the south). In particular, the south facade of the building is quite dull and boring, unable to reflect the design characteristics of School of Architecture as a design college. The small pieces of face bricks has long been obsolete, it goes wrong with the styles of the surrounding buildings (especially the dry-hanging stone materials used by the building of Academy of Arts & Design on the west). In addition, many bicycles are stopped at the main entrance on the west and severely impair the aesthetics of the building. When there's a storm, the bicycles would fall on the ground and cause a mess. Fixed bicycle parking spaces on the north side of the building are not utilized and this is what should pay attention to.

Public spaces of the building: only the two small exhibition halls located on the west entrance of the building can be considered as large public spaces. The current building has no other large public space, such as big exhibition halls and large spaces for communication and rest, which are all essential components for a modern design college. Small communication spaces are normally not private enough and don't feature humanized design.

Teaching space: the design studios located in the third and fourth floors are crowded to capacity. The design studios are separated partition walls, and the part close to the corridor has a public space for teacher-student discussion, there's really not much space left for the students to design. Books and computers occupy their personal spaces. And the school only has one model room, there's no space for the students to make models themselves.

Teaching auxiliary space: the existing administrative office can barely meet the teaching require-ments. But the teachers' offices become especially small; each of them supervises graduates or doc-toral candidates and the some space in the tidy office has to be set aside for them.

5. Preliminary Positioning of Building Renovation

The preliminary positioning of building renovation is a modernized teaching center full of sense of design and exuberant spaces. The outdoor courtyard will be the main point of renovation and it will be expanded. Indoor courtyard, exuberant spaces, communication and rest spaces, teaching spaces, teaching auxiliary spaces and networked study room will be added. The original building spaces shall be optimized and the resources will be re-allocated to add large exhibition halls and model rooms. Bicycle fixtures will be installed near the west main entrance of the building to avoid the bicycles from falling down; the number of bicycles parked here shall also be reduced by guiding some students to park their bicycles on the north side of the building (the main reason for them not to park their bicycles there is that it is too far from the main entrance. We plan to expand the courtyard and set one more entrance at the west side of the building. The flow of students will be diverted diverged and quite easily, some students will park their bicycles at the north side of the building).

6. Functional Compositions of the Building Renovation

A. Office Area: We didn't plan too many changes to the administrative office areas, which will be concentrated in the first floor of the building like before. The reason for such an arrangement is that

students are not only subjects, but also service objects in the school; having the administrative offices located on the first floor can provide conveniences to the students to the largest extent. For the faculties, they won't need to climb up the stairs or squeeze in the lifts, and the first floor can effectively keep out the hot air in Beijing during summer.

B. Public Space: There are two small exhibition halls located on the south and the north side of the lobby on the west side of the building. We plan to use the north exhibition hall as a coffee communication and rest area while the south exhibition hall will still serve as a small temporary exhibition hall. The coffee communication area can provide a fine space for the communications between students and teacher, and it can also increase the popularity of the lobby. It was revealed in our investigation that most of the students of School of Architecture couldn't find a space to stay, not to mention sitting down and have a discussion (there were a few communication areas in the building, but they are very small and uncomfortable).

C. Teaching area: the existing building is in severe shortage of teaching spaces. We leave a large space for teaching in our courtyard expansion, including the graduate classrooms and model rooms (the previous model rooms are insufficient and can only accommodate one machine; there's no space for students to practice or store their works).

Acknowledgment

References

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