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Exploration into the Practice of Curriculum Teaching Reform for Landscape Architecture in Higher Vocational Education under the "Design-Build" Workshop Model

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Abstract: ***Through collecting, analyzing and researching the design-build course system and workshop process of domestic and foreign landscape architecture majors, we put forward a design-build workshop operation mode suitable for higher vocational landscape architecture majors, and establish a design-build progressive course system of modular and comprehensive courses. For the comprehensive course "Design Elite Skills Training", we carried out the curriculum teaching reform, relying on the actual garden project - the future garden of 2022 Shenzhen Bougainvillea Show to carry out the practical teaching of "design-build" workshop, and complete the whole process of the experiment. This will provide a feasible direction for the reform of senior or vocational undergraduate landscape architecture.***

Keywords: Design-build, Landscape design, Workshop, Practice teaching.

1. Introduction

The workshop represents a participatory, experiential, and interactive learning modality. It traces its roots back to the Bauhaus School in Germany and constitutes an interactive teaching approach advocated by Walter Gropius, the pioneer of modern architecture design, who emphasized the equal importance of technology and practice [1]. The series of courses stemming from the "design-build" model are designed to enable architecture students to experience and comprehend the entire project implementation cycle of "design - construction - on-site design", integrate landscape and architecture designs in diverse environments, acquire collaborative design skills, and construct a permanent project. By conducting research on the "design-build" courses of landscape architecture majors in numerous schools both domestically and internationally, this paper summarizes and draws on relevant experiences to optimize the teaching reform of landscape design courses. Additionally, a teaching practice exploration was carried out through the implementation of a "design-build" workshop in the Future Garden exhibition area of the 2022 Shenzhen Bougainvillea Show. It is advocated that the design-build workshop should serve as the fundamental model for landscape design teaching, thus presenting new perspectives for the teaching of landscape architecture in higher vocational colleges or vocational undergraduate programs.

2. The Process and Curriculum System of the "Design-Build" Workshop for Landscape Architecture Majors at Home and Abroad

2.1 Development and Problems of the "Design-Build" Workshop

Since the 1920s and 1930s at the Bauhaus, the stronghold of modernism, "design-build" has been an important topic in architecture majors. Education was based on artisan training and built on the foundation of materials, handicrafts, workshops and apprenticeship relationships. Famous architecture majors in domestic and foreign universities have adopted the form of design-build workshops for teaching reform. For example, since 1996, the School of Architecture of Yale University has cooperated with non-profit organizations to offer construction project courses to build houses in poor communities. Since 1997, the School of Architecture of the Chinese University of Hong Kong has offered the basic design course "Design and Construction of Pavilions" in the first year. Design-build courses attach great importance to emphasizing students' overall control ability of design projects through physical construction in the teaching process, and regard it as a necessary way for students to understand design concepts, master design methods and improve operation skills. Through teaching reform, systematic guidance and instruction are carried out, and gradually a design workshop teaching system with the design-build model is formed.

The design-build courses of landscape architecture began with the design-build activities carried out by Professor Daniel Winterbottom on the campus of the University of Washington in Seattle in 1995. After nearly 20 years of development of landscape architecture education, many domestic colleges and universities such as Beijing Forestry University, Sichuan University, South China Agricultural University and Xi'an University of Architecture and Technology have set up student design-build workshop projects, building a practical platform for real construction as an important starting point of the talent training program. In addition, the garden design and construction jointly carried out by universities has also become a characteristic competition activity of landscape architecture majors. Among them, the "BFU International

Garden Construction Festival" held by Beijing Forestry University since 2018 has the widest radiation and the greatest influence among universities.

Some higher vocational colleges have also carried out small-scale experimental construction teaching research in landscape design courses. For example, the landscape architecture design major of Shenzhen Polytechnic has set up the course "Courtyard Design and Construction" and participated in the community co-construction gardens in Shenzhen. However, most of them exist in the form of independent small topics and course units, and a standardized and complete workshop teaching system has not been formed, and its teaching effect has not been promoted. Specifically, the development of "design-build" courses in domestic higher vocational colleges has the following problems:

A perfect teaching process and system have not been formed. Generally, the design-build workshop relies on actual projects, and it is especially important to determine the project source and implementation method and teaching design. The project needs to be promoted by multiple parties, and colleges and universities cannot carry out teaching completely in accordance with the operation mode of enterprises and companies.

The guarantee of teaching space and facilities is insufficient. Most colleges and universities do not offer design-build courses mainly due to insufficient construction site space and construction funds, complex school reimbursement processes and cumbersome construction promotion processes. Most of them complete teaching with theory + design projects.

There are certain difficulties in constructing the teaching team of the workshop. Landscape design-build courses involve multiple courses and have a wide range of knowledge. Compared with European and American countries where a design course has a teaching team of more than 5 - 6 teachers, in the traditional teaching mode in China, 1 - 2 teachers are often responsible for a course, and it is difficult to carry out workshop teaching under the existing system.

2.2 Reference of Curriculum System and Teaching Design

Through the investigation and comparison of the "design-build" courses of landscape architecture majors in 5 applied science universities and 5 universities in Germany, 10 universities in the United States, 5 universities in the United Kingdom, 5 universities in Japan and 5 universities in China, this paper explores the introduction of the workshop teaching mode into the landscape design major of higher vocational colleges and carries out teaching reform of some design courses to form a teaching system and method of the design-build workshop.

German applied science universities are characterized by emphasizing practice in teaching. In landscape architecture majors, design-build courses and workshops are usually set up, and the two-track progressive mode enhances students' innovation and implementation abilities of design schemes. Taking the Weihenstephan-Triesdorf University of Applied Sciences as an example, all relevant majors of landscape architecture majors take the course "Planning, Conception and Construction" in the first semester. Students majoring in landscape construction management need to participate in project workshops in the 3rd and 4th semesters. The workshop projects are 5 - 10 credits and 12-week courses. They are required to complete the whole process from design to construction in groups. In the form of actual project workshops, students deepen their understanding of the landscape design process, especially in the project concept, design, implementation plan and technical details stages, and acquire the basic skills of project cost calculation and tracking. Compared with applied science universities, traditional German research universities pay more attention to the cultivation of all-round abilities and all-scale landscape planning and design thinking in the undergraduate curriculum system of landscape architecture. For example, the School of Landscape Architecture of the Technical University of Munich offers small-scale landscape design projects or medium and large-scale landscape planning project courses for students to choose from the 1st semester to the 7th semester. Generally, project courses are carried out in the form of workshops, and a design project is completed in one semester. In the lower grades, the design project types often combine the construction mode, and the site is mostly on campus, such as the garden renovation design and construction in the front yard of the main building of the department. In the senior or graduate stage, design-build workshops are carried out in combination with parametric design, green technology, etc. The design stage is divided into three stages: conceptual design, schematic design and detailed design. After the reporting and bidding process, a scheme is finally determined, and all students participating in the workshop promote the details and design construction together. The "Tree Pavilion" workshop guided by Professor Ferdinand Ludwig of the Technical University of Munich requires students to design, build and grow a structure for dining and holding activities in the artist exhibition area of Baden-Württemberg using plants as building components. The student team used photogrammetric point clouds to design the building frame, adapted to the natural growth form of the trees on the site, determined the scheme, and then used digital construction to deepen the details. They learned from scratch in the workshop and completed most of the structures of the artificial components by hand, and transported them to the site to complete the installation of the structure. The participating students described it as the most innovative and fulfilling workshop project.

In the undergraduate teaching system of landscape architecture in the United States, landscape design and construction are compulsory courses starting from the sophomore year, including the University of Massachusetts Amherst, Texas A&M University, Ohio State University, etc. Texas A&M University offers Landscape Design 1, 2, 3 as precursor courses, followed by Landscape Construction 1, 2, 3 as compulsory courses, each with 3 - 4 credits, 2 hours of theory and 4 - 9 hours of practical training per week. The design-build workshop of the University of Washington in Seattle is a model worthy of promotion and reference. It is an elective course for undergraduates and graduate students of landscape architecture since 1995. There are about 15 - 18 students in the workshop. Usually, a 5-week design-build course is held in the summer vacation from June to August every year. The first week is for design and coordination,

three weeks are for construction and implementation, and the last week is for summary and tour. The project tasks are different every year. Generally, workshops are carried out in cooperation with local or overseas communities, such as designing and building a community gathering place in Trondheim, Norway, designing and building a healing courtyard garden near Seward Park in Seattle, creating a community garden in cooperation with local immigrants and refugee communities in Dalsland, Sweden, and designing and building an outdoor space for a rehabilitation hospital in Croatia. The students participating in the design-build workshop said that unlike the unrestrained design in a simple design course, the design-build process forces them to consider the practicability, budget and feasibility of the design. Compared with the flexible workshop teaching mode of the University of Washington, the design-build series courses of Mississippi State University are set in the form of "three modular courses (materials, site, hydrology) + comprehensive training course", with a total class hour of more than 500 hours. The four courses are offered in the fall and spring semesters in turn. Each course is based on community landscape cooperation projects, including three course stages: theoretical teaching, measurement and design, and construction. New materials and new technologies are encouraged to be tried in the projects.

In recent years, many domestic colleges and universities have carried out teaching reform of design-build workshops in landscape architecture majors, usually in the form of project-based courses, open elective courses, a module in compulsory courses or competitions. The landscape architecture major of Shanghai Institute of Technology adheres to the real engineering practice teaching task-driven model. The Studio in spring and autumn every year relies on "courses + campus garden construction festival", requiring junior students to design and build creative gardens or rain gardens on the campus base, practicing the "design-build" project teaching of landscape architecture. The teaching team of landscape architecture of Sichuan University introduced the form of design-build workshop into the "Design and Construction" course module of the "Fundamentals of Landscape Design - 2" course for freshmen. The course module is completed through five workshop nodes: site selection and site design, determination of site selection and preliminary scheme, determination of group scheme, mid-term achievement report and final achievement report, strengthening the positive interaction between teachers and students and the connection ability and teamwork ability of students in design and construction. The "BFU International Garden Construction Festival" is a garden design and construction activity carried out in the form of a competition. It has become an event that landscape architecture students from major domestic universities actively participate in every year. It is divided into three stages: solicitation of scheme design, drawing of construction drawings of selected works and feasibility docking, and on-site construction, fully stimulating the design creativity and practical construction ability of landscape architecture students.

Most of the landscape architecture majors in relevant British universities do not set up special design-build courses. Generally, design studios and construction technology courses are set up separately, and drawings or reports are used as course assignments. Since the 1980s, Japanese garden education has focused on developing a practical teaching system of creation and production, setting up practical courses, experiencing gardening processes such as transplantation and pruning, and learning construction management techniques from professional gardeners. The design-build curriculum systems of landscape architecture education in Germany and the United States are relatively more mature and are worthy of our reference and learning in terms of serving the community and innovative design and construction. Realizing the combination of sociality and practicability in garden teaching is an important teaching topic for improving the landscape architecture professional education system. Relying on the "design-build" workshop form for teaching reform is a direction worthy of further exploration and practice for higher vocational landscape architecture majors.

3. The Optimization Path of the Curriculum of Landscape Architecture Majors in Higher Vocational Colleges under the "Design-Build" Workshop Model

The introduction of the workshop teaching mode into the landscape design major of higher vocational colleges mainly aims to enhance students' innovation and practical abilities, accelerate the transformation of classroom knowledge into implementation ability, improve students' attention to technical courses such as structure and materials, cultivate students' comprehensive design qualities in all aspects, fully tap students' potential, enhance students' employability and provide a platform for the interaction of "industry - university - research" in colleges and universities. Integrate the landscape design knowledge system from all aspects such as design concept, team organization, material and construction experiment and space experience. Through the design-build workshop as the basic model of landscape design courses, draw lessons from the design-build course settings of excellent domestic and foreign universities and propose new reform directions for the teaching of landscape architecture in higher vocational colleges or vocational undergraduates.

3.1 Setting Ideas of the "Design-Build" Curriculum System

Introduce the design-build workshop into the talent training program. Instead of carrying out teaching reform for a single course, systematically infiltrate the design-build workshop teaching mode through "modular courses + comprehensive courses" in a progressive manner (Figure 1). According to the curriculum system of the 2022 landscape architecture design major of Shenzhen Polytechnic, compulsory courses such as "Landscape Architectural Materials and Structures", "Landscape Planting Design" and "Courtyard Design and Construction" can be used as design-build modular courses, and design-build project units are added to the courses. In the course of "Landscape Architectural Materials and Structures", the construction link is added to the original project units, such as square pavement design and construction and landscape wall design and construction. In the course of "Landscape Planting Design", which currently focuses on design drawings, it is difficult to build large-scale projects. Considering the flower border project unit, the design and

construction of flower borders can be carried out on campus or in communities that need renovation. The course of "Courtyard Design and Construction" combines the real garden site to carry out the design-build workshop. Through modular courses, students master the design and construction methods of basic elements such as landscape materials, plants, structures, terrain and waterscapes. Senior students participate in the design-build workshop of a complete project through comprehensive courses. The course forms include elective courses - Design Elite Skills Training, graduation design, maker-type project courses, etc. The maker-type project course is a project-based elective course of Shenzhen Polytechnic relying on teachers' scientific research or teaching research projects. It needs to be declared and submitted regularly for teaching plans. Essentially, it is also a workshop mode. Considering the implementation cycle and other issues, the project topic is recommended to be small-scale spaces such as community gardens, flower show competitions, roadside green spaces and urban space micro-renewal. Strengthen cooperation with enterprises and institutions and advocate the integration of new technologies to serve cities and communities sustainably. How to effectively connect the actual project cycle with the course design arrangement is also a key problem that the design-build workshop needs to focus on solving.

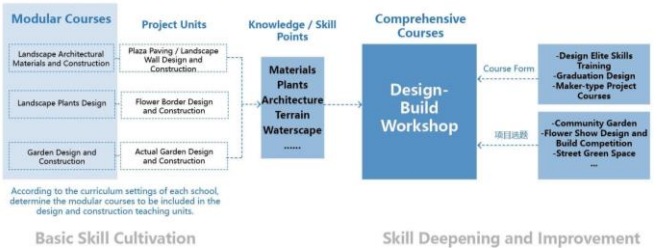

Figure 1: Reform ideas of the "design-build" curriculum system

3.2 Teaching Practice of the "Design-Build" Workshop Model

To build a real project practice platform and realize the whole design process with the goal of construction, the landscape design teaching team of Shenzhen Polytechnic introduced the design-build workshop for pilot teaching reform. In the fall semester of 2022 - 2023, the design-build workshop was carried out relying on the course "Design Elite Skills Training". The project topic was the design and construction competition of the Future Garden of the 2022 Shenzhen Bougainvillea Show. The Shenzhen Bougainvillea Show is one of the major events of the park culture season jointly hosted by the Shenzhen Municipal Urban Administration and Comprehensive Law Enforcement Bureau and the People's Government of Futian District, Shenzhen. It is held in Lianhua Mountain Park in mid-late November every year. Since 2021, the Future Garden exhibition area has been set up in the Shenzhen Bougainvillea Show, providing a competition stage for landscape architecture.

"Design Elite Skills Training" is a professional elective course offered to junior students majoring in landscape architecture design, with small-class teaching of 10 - 12 students. A total of 12 students participated in this design-build workshop and were guided by 5 teachers. From the 1st week to the 4th week, in the scheme stage, ideas were pooled together and 4 schemes were completed to participate in the selection. After the evaluation by experts, 2 scheme works entered the implementation stage. Before the formal construction, three task links were set up: construction drawing design, material list and cost, and material procurement and preparation. After formulating the construction plan, the on-site construction was completed in one week (Figure 2). In traditional landscape design teaching, students often need to strengthen their understanding and application of plants and garden building materials as well as their perception of actual spatial scale. The design-build teaching mode enables students to transition from the understanding type to the practical integration type in terms of material technology, spatial structure, cost control and construction experience, and change from the passive acceptance of teaching content to the active exploration process, thus improving their learning enthusiasm.

Figure 2: Design and Construction Process of the Work "Books are unfolded like blossoming flowers"

Questionnaires and one-on-one interviews were conducted among the participating students after the course. More than 70% of the students believed that cost control was a difficulty in actual projects. 75% of the students indicated that their professional knowledge in construction technology needed to be strengthened. 65% of the students found that there was a certain gap between the scheme design and the actual construction effect and the connection needed to be improved. Knowledge points such as cost, structure and materials were no longer just theoretical, and students could apply their professional knowledge to actual projects. More than 95% of the students reported that it was easier to obtain a sense of learning achievement in the design-build workshop. The works were well received by the public, strengthening students' sense of professional identity and pride.

4. Summary and Prospect of the "Design-Build" Workshop Teaching

The course was carried out with actual landscape projects as the carrier to verify the teaching reform ideas of the "design-build" workshop. The overall teaching effect was good, solving the problems of students' perception of construction effects and the blank in the connection between design and construction, and integrating art and engineering. After the implementation of this design-build workshop teaching reform, the following teaching summaries were obtained:

Construction of a stable and reasonable teaching team. The design-build workshop model involves the whole process of scheme design, construction drawing design, on-site construction and cost. Building a stable and multi-specialty teaching team is the cornerstone. The design-build workshop of "Design Elite Skills Training" operates with a "2 + 2 + 1" teaching team, including two professional teachers in the design direction to guide the whole process, two teachers in the engineering and plant directions to participate in the guidance during the construction process, and one enterprise mentor to guide on site. The design concepts, methods, technologies and expressions of different teachers and students are also diversified. Only the collision of different views can form innovation points, continuously promoting the innovative development of higher vocational landscape design teaching and practice.

Optimization of course content and arrangement according to the project. Generally, the design and construction cycle of actual projects is irregular and time is tight. It is necessary to reconstruct the course teaching design in advance according to the project tasks and time node requirements. The course framework structure takes three main links as the main line tasks, namely scheme design, construction drawing design and construction preparation, and on-site construction. The course time is limited, and students are required to complete more tasks after class. For example, in the design-build workshop of the 2022 Shenzhen Bougainvillea Show, the construction time was tight and the total course hours were limited. The class hours of the construction stage were only 20 hours. In order to present better implementation effects and achieve better results in the competition, students spontaneously used their spare time to complete the construction of the works.

Professional course funds and policy support. The construction link of the workshop requires professional fund support and school policy system support to provide facilities and equipment guarantee. In the absence of cooperation projects, priority should be given to the selection of campus green space renovation or partial outdoor space micro-renewal projects, and the whole process experience from design to construction should be completed on campus using course funds.

Cooperation with enterprises and institutions to serve the community. Relying on project types such as the Shenzhen Bougainvillea Show and community co-construction gardens, a joint teaching model of landscape design and construction of "open collaboration + learning and research interaction" was carried out, reconstructing a design-build workshop model suitable for higher vocational landscape architecture, expanding the dimension of cooperation with enterprises and institutions and connecting with actual projects. Connecting theoretical teaching and paper drawing with practice, students can understand the whole implementation process of the project, better connect with work positions, and build the connection between campus learning and actual work throughout the whole process of talent training to serve the community and beautify the city.

In general, the "design-build" workshop model provides a new perspective for the teaching reform of design courses in higher vocational landscape architecture majors. It is not limited to the teaching of design or construction. In addition to "learning by doing", design, artisan processing and the materialization of the construction process, it is more inclined to the "locality" of design, training students' abilities to communicate and discuss problems, connect the construction progress with Party A, and contact material and equipment suppliers. Generally speaking, it is the inheritance and development of the traditional design teaching model. This teaching model is more flexible and diverse, the communication is more extensive and in-depth, and the topics discussed are often more targeted and practical. By defining the urban or community problems in the real field, students are guided to explore the innovative concepts and methods of landscape design from multiple dimensions and depths, promoting the whole process of collaborative design and construction training, and cultivating innovative skilled craftsman talents with teamwork spirit and communication and integration ability.

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