



Construction and Reform Practice of Landscape Plant Course Group in Landscape Architecture under the Background of Emerging Engineering Education

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Abstract. Landscape plant courses, with strong comprehensiveness, practicability and applicability, are one of the characteristic and core courses of Landscape Architecture Program. In view of the existing problems in the current curriculum, this study proposes the following construction goals: 1. Establish the teaching objectives based on the ability training of "Identification - Cultivation - Application", and give full play to the important role of landscape plants in creating a green and ecological living environment; 2. Develop a teaching content characterized by "ecology, innovation, and expansion", echoing the professional responsibility of Landscape Architecture in "taking harmonizing the relationship between humans and nature as its fundamental mission"; 3. Promote the cross-integration of landscape plant courses and planning and design courses, and cultivate the comprehensive ability to use plant landscape to create a healthy and livable living environment. Finally, students will be trained to "understand plants, love plants, and use plants", so as to build a landscape plant course group suitable for the cultivation of landscape architecture professionals with practical innovation ability, and promote the construction of first-class undergraduate programs in Landscape Architecture.

Keywords: Landscape Architecture; landscape plant course group; identification - cultivation - application

1 Introduction

With the fundamental mission of harmonizing the relationship between humans and nature and the creation of outdoor space as its core content, Landscape Architecture is a cross-cutting and comprehensive discipline that integrates historical theory, planning and design, ecological restoration, heritage protection, plant application, and engineering technology ^[1-3]. In 2017, the Department of Higher Education of the Ministry of Education put forward the "Emerging Engineering Education" plan. It takes the construction of "Emerging Engineering Education" as a "catalyst" for the comprehensive reform of colleges and universities, aims at systematically promoting the comprehensive reform of university organizational models, discipline and professional structures,

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talent training mechanisms, and teacher evaluation and incentives, thereby promoting and leading the in-depth reform of higher education [4]. Under the background of the construction of "Emerging Engineering Education", the Landscape Architecture Program of the Beijing City University focuses on the synergistic development of multiple disciplines, constantly consolidates the foundation of engineering, closely follows the needs of the social industry, and cultivates high-quality and application-oriented talents who master the theoretical knowledge and practical skills of Landscape Architecture, and can be engaged in project planning and design, ecological protection and restoration, plant landscape planning and design, engineering construction and management, plant cultivation and maintenance in landscape architecture and related industries.

2 Current Situation and Problems in the Construction of Landscape Plant Courses

Landscape plants, as one of the most important factors in the construction of garden space, have become the most significant feature of landscape that sets them apart from other environmental designs because of their wide variety and rich shapes, coupled with seasonal changes, and play an irreplaceable role in creating a green and ecological living environment. Chen Junyu, an academician of the Chinese Academy of Engineering, once pointed out that the biggest feature of Landscape Architecture should be reflected in the landscape plants [5-6]. The British gardener Brian Clouston also proposed that, landscape design is ultimately the design of plant materials, with the purpose of improving the human ecological environment, and other contents can only play a role in an environment with plants [7-8]. In the different development stages of Landscape Architecture discipline, the role and status of landscape plants, as the basis for realizing the planning and design objectives and the carrier of sustainable development of human habitat, have been the consensus of landscape architecture professional education. Therefore, the setting and construction of landscape plant course clusters play an important role in the cultivation of professional talents [9-11].

2.1 Current Status of the Curriculum for Landscape Plant Courses

The module setting of landscape plant courses of Beijing City University is as follows: firstly, students shall learn about the identification characteristics, ecological habits, and application methods of common landscape plants through the study of "Landscape Dendrology" and "Ornamental Flowers". Relying on the "Fundamentals of Ecology", students will establish the basic concept of "interdependence between plants and the environment", and then master the propagation, planting, pruning and maintenance techniques of plants through "Landscape Plant Cultivation and Maintenance". Finally, students will be trained in the planting principles and configuration forms of garden plants via "Plant Landscape Planning and Design", so as to achieve the goal of scientific application of garden plants in urban green space.

2.2 Problems Existing in the Teaching of Landscape Plant Courses

The following are the main problems existing in the current curriculum and teaching practice of landscape plant courses:

Insufficient teaching hours in some courses.

The number of hours allocated to "Landscape Dendrology" and "Ornamental Flowers" are 30 hours and 45 hours respectively. The lack of theoretical hours leads to the fact that the content of many chapters in the course cannot be taught in detail or can only be discarded, while the lack of practical hours leads to students having only a partial understanding of the identification characteristics of common landscape plants, and some students even develop the bad habit of relying on plant identification software such as "Shape and Color" App.

Overlap in curriculum content setting

By sorting out the contents of the courses, it is found that there are overlapping knowledge points, for examples, the knowledge point "propagation techniques of landscape plants" is in both "Landscape Dendrology" and "Landscape Plant Cultivation and Maintenance", the "plants and ecological factors" is in both "Ornamental Flowers" and "Fundamentals of Ecology", and the "applied forms of garden flowers" in "Landscape Dendrology" and "Plant Landscape Planning and Design". In the case of a relatively small amount of course content, the overlapping of knowledge points will not only reduce the effectiveness of teaching, but also cause students to lose interest in learning the course and other consequences.

Insufficient articulation with planning and design courses

The disconnection between the teaching of plant courses and planning and design courses makes students fail to form a complete knowledge structure and a sense of the overall view of professional knowledge, and cannot truly understand the necessity and importance of landscape plants in planning and design, leading to a mentality of "emphasizing design and ignoring plants". How to realize the effective connection between plant courses and planning and design courses is very important to realize the cross-integration between professional courses and improve students' professional comprehensive ability.

Relatively weak practical teaching links

According to the cultivation goal of application-oriented talents in landscape architecture, the courses of landscape plants should focus on the cultivation of students' practical skills. Some agricultural and forestry colleges and universities have established on- and off-campus practical teaching bases to assist teaching^[5-7,12], for example, Beijing Forestry University has Bajia Nursery and Jiufeng Practice Base, Xi'an University of Architecture and Technology has on-campus garden practice bases, and Beijing University of Agriculture has the Dongdadi Nursery, etc. These practical teaching bases

provide good platforms for the cultivation of students' practical skills. Therefore, establishing on- and off-campus practical teaching bases is also a problem that needs to be solved.

3 Measures to Build Landscape Plant Course Clusters

3.1 Adjustment of the Curriculum of Landscape Plant Courses

The scientificity and rationality of the course content are the prerequisites for achieving the goal of professional talent training. Under the premise of fully considering the discipline connotation of Landscape Architecture and the needs of the industry, the course team shall optimize the course contents and adjust class hours to construct the landscape plant course clusters of "identification as the premise, cultivation as the foundation, and application as the goal". The adjustments of course content and class hours are shown in Figure 1.

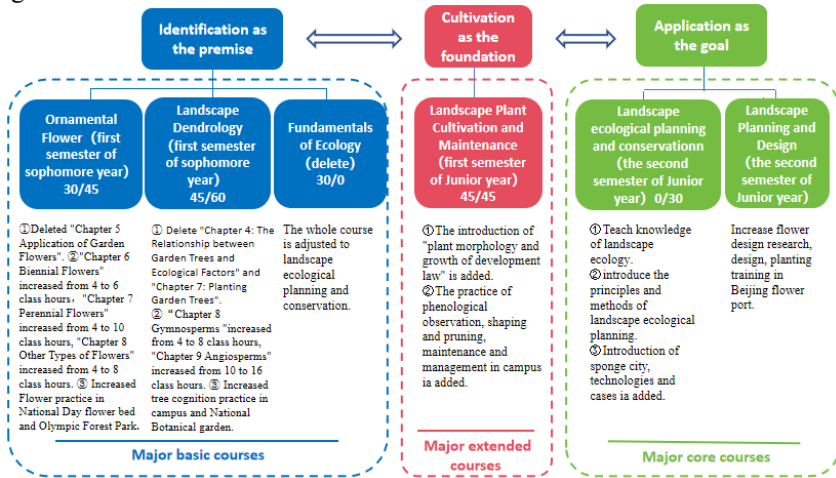


Fig. 1. Landscape plant course clusters based on "Identification as the premise, cultivation as the foundation, and application as the goal"

3.2 Construction of the Teaching System of the Landscape Plant Course Clusters

In view of the students' mentality of "emphasizing design and ignoring plants", the teaching team and the planning and design course team jointly constructed a "joint teaching system of plant + planning course cluster", and put forward the basic idea of "integrating plant teaching content into planning and design courses" (Figure 2). The ability training of "identification - cultivation - application" of the plant courses runs through the learning of the entire professional courses, so as to form the repeated, consolidated and expanded learning of the teaching content of landscape plants, and achieve the design and training goal of plant elements.

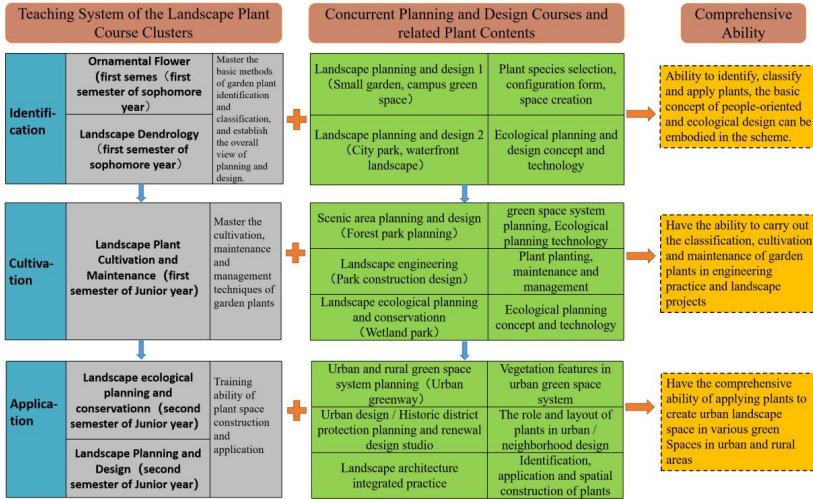


Fig. 2. "Plant class + planning class united teaching system" of Landscape Architecture in Beijing City University

3.2.1 The "Identification" Stage

Students are guided to form the basic ability of landscape plant identification and classification through the courses of "Landscape Dendrology" and "Ornamental Flowers". During the plant identification practice, students can master the identification characteristics of common landscape plants in Beijing and are able to visualize the important role of landscape plants in seasonal changes and space creation.

In the urban parks and urban waterfront landscape task books of the courses of "Landscape Architecture Planning and Design 1" and "Landscape Architecture Planning and Design 2", the relatively clear, specific content and depth requirements for planting design, plant landscape planning or vegetation landscape planning are put forward according to the teaching objectives of the plant course cluster. In the teaching process, students are required to use and consolidate the comprehensive ability of garden plant identification, classification and application in the process of establishing planning and design objectives and scheme conception through different emphases and perspectives.

3.2.2 "Cultivation" Stage

Two sections have been added to the course "Landscape Plant Cultivation and Maintenance" in the fall semester of 2023: "Expert Lecture" and "Plant Pruning".

A senior engineer from Beijing Jingcai Yanyuan Nursery, gave a lecture on "Green Production Technology of Seedlings", which introduced the latest production technology, production process, how to reduce the cost of seedlings, and fine management and care in detail, which benefited the teachers and students and the staff of the campus greening department greatly.

In this round of teaching, we carried out joint teaching with the campus greening department, and invited experienced greening technicians to demonstrate the pruning methods and steps of large-leaved boxwood hedges and apricot trees for the students, and the students completed the pruning of the green space around the training buildings in groups. Through this campus plant landscape pruning training, students no longer have a half-understanding of plant pruning, but really understand what is a long branch, whorl branch, parallel branch, drooping branch, and know how to achieve "know firstly, see secondly, cut thirdly, check fourthly, treat fifthly, and protect sixthly" when pruning.

2.2.3 The "Application" Stage

After the first two stages of study, students have accumulated a certain degree of morphological identification and Landscape Plant Cultivation and Maintenance. In the course of "Plant Landscape Planning and Design", three practical training sessions are set up to guide students to complete the whole process from site investigation - planting design - planting construction - maintenance management. Students are required to hold the integration of ecological planning, biological diversity, and other concepts to strengthen the important role of plant landscape in urban and rural areas of various types of green space. In this way, students are guided to ultimately have a comprehensive ability to use plant landscape to create healthy and livable habitats.

3.3 Reform and Innovation of Teaching Methods

3.3.1 Blended Teaching Helps Classroom Instruction

To help students better understand and master the theoretical knowledge of the courses on landscape plants, a blended teaching method has been introduced to "Landscape Dendrology" and "Ornamental Flowers". Taking the course of "Landscape Dendrology" as an example, a blended teaching platform based on UMOOC and Teacher-mate has been established, thus forming a "pre-class exploratory learning - in-class targeted learning - post-class extended learning" progressive teaching mode. It effectively stimulates students' enthusiasm for professional learning, exercises their independent learning ability, and improves their practical innovation ability.

3.3.2 Integration of Ideological and Political Education Into the Teaching Process

In the teaching process, the course team combined their respective course content to dig deep into the ideological and political elements from the aspects of flower culture, traditional culture, ecological civilization construction, and low-carbon environmental protection concepts, and strived to achieve the ideological and political teaching goal "like salt into water, moisturizing things silently".

3.3.3 "Competition for Teaching, Competition for Learning" Across the Plant Course Clusters

The teaching team has gradually formed the teaching mode of "competition for teaching, competition for learning" in the teaching process. The implementation of "teaching - learning - competition" integration mode encourages students to submit their course design assignments to the competition. Instructional design assignments are based on the requirements of the design competition, and the previous award-winning works can also become teaching cases on the topic. Students can not only improve their professional ability through the competition, but also effectively enhance their enthusiasm and self-confidence in professional learning, and truly achieve the course goal of "promoting teaching and learning through competition".

3.4 Strengthening Practical Teaching

Regarding how to help students better master the relevant professional practical skills and become the talents that industry enterprises really need, the teaching team has done a lot of construction work in the practical teaching link relying on the talent training model of "3+1" (3 years of study in school + 1 year of industry internship) of the university.

3.4.1 Improve the Quality of Education Through Practice Bases

The Department of Urban Construction has established a number of on-campus and off-campus teaching and practice bases for landscape plants, including the Ecological Wall of Plants and Landscapes in the lobby of No.5 Training Building (on-campus), Beijing International Flower Port (off-campus), and The Museum of Chinese Gardens and Landscape Architecture (off-campus), and other bases. The course team has accomplished the practical training teaching tasks of many plant courses with the help of the on- and off-campus bases.

3.4.2 Organize Student Clubs to Stimulate Professional Enthusiasm

We integrate the knowledge of landscape plants into students' learning, life and growth, and cultivate students' mentality and ability of "knowing plants, loving plants and using plants". Wumu Horticulture Club is a professional club organized around the application of garden planting. A group of plant-loving students will apply the knowledge and skills learned in the classroom in ecological tanks and plant walls, which really realizes the practical application of what they have learned.

4 Problems and Improvement Measures

4.1 Students' Ability to Identify Plant Species Needs to be Further Strengthened

Although the plant identification, discipline competition, labor education and other links have improved the students' plant identification ability to a certain extent, the phenomenon of not being able to distinguish common species and relying on plant identification software such as "Shape and Color" still exists among some students. The

training of plant identification should be carried out throughout the year. Relying on the "Campus Plant Research and Mapping" project being carried out, the course team plans to establish a campus plant guide atlas of Shunyi Campus of Beijing City University, so as to help students who are interested in plants in landscape architecture and other majors to carry out plant identification practice more conveniently.

4.2 Continue to Strengthen School-Enterprise Cooperation and Education

It is recommended that a nursery cognitive internship be added to the plant cognitive internship program. The cognitive internship in the nursery can enable students to understand the important links of seedling selection, transportation, planting, maintenance and management from the nursery to the construction site, and to fully understand the relationship between plant design and seedling quality, specification and later cultivation, maintenance and management.

4.3 Further Refine the Specific Requirements for Plant Application in Design Courses

In the planning and design courses, the content of drawing results and the requirements of drafting specifications need to be further clarified, and the construction drawing design process should be increased in conjunction with the existing site analysis and scheme design sessions, to emphasize the students' grasp of plant specifications and spatial scales.

5 Conclusion

Through a series of teaching reforms and practices in the group of landscape plant courses, the course team has basically established the teaching objectives of plant courses based on the cultivation of the ability of "identification - cultivation - application", and has given full play to the important role of landscape plants in the creation of a green ecological human environment, has formed the teaching contents of plant courses characterized by "ecology, innovation and expansion", echoing the professional responsibility of landscape architecture of "taking harmonizing the relationship between humans and nature as its fundamental mission", has promoted the cross-integration of landscape plant courses and planning and design courses and cultivated the comprehensive ability to use plant landscapes to create a healthy and livable living environment. In the subsequent construction of the course group, it is necessary to continue to carry out reforms and practices in terms of improving "curriculum integration, teaching interactivity, project challenge and knowledge expansion", highlighting the characteristics of professional advantages and continuing to optimize the teaching system, keeping up with the needs of the society and industry, actively innovating the teaching methodology, and focusing on the cross-integration of disciplines and exploring the depth and breadth of the courses. Meanwhile, the cultivation of "cultural self-awareness and

cultural self-confidence" is integrated into the curriculum as the course ideological and political objectives, so as to cultivate "deep-rooted, pioneering and innovative, cross-integration" applied talents in landscape architecture.

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