Journal of Innovation and Development
ISSN: 2958-4752 | Vol. 15, No. 3, 2026

Research on the Construction of Open Laboratories for Landscape Architecture Based on Discipline Competitions

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Abstract: This paper focuses on the cultivation of innovative applied talents in landscape architecture. It explores Construction Ideas for open laboratories based on discipline competitions and discusses key construction pathways, including optimizing laboratory spatial layouts, improving the allocation of laboratory resources, establishing the open operation mechanism, standardizing the open management system, strengthening the teaching team, improving the competition reward mechanism and initial effectiveness of the open laboratory construction. The research shows that this model can effectively enhance students' practical abilities, innovative thinking, interdisciplinary collaboration skills, and comprehensive competence, thereby providing sustainable support for the cultivation of landscape architecture professionals.

Keywords: Discipline competition, open laboratory, landscape architecture, experimental teaching.

1. Introduction

In the new era, the primary goal of talent cultivation in China is to cultivate talents with innovative spirit and practical ability. The main competitiveness of these innovative talents in landscape architecture lies in integration and implementability. Therefore, the research on professional education is to build students' knowledge systems,promote practical ability and nurture an exploration spirit [1]. Discipline competitions and open laboratories are both important directions in the reform of practical teaching. They provide effective pathways to nurture innovative applied talents [2, 3]. Discipline competitions provide valuable opportunities for students to engage in inquiry-based and cooperative learning. They can foster students' ability to solve problems and be creative in their design, as well as promote laboratory construction and the reform of laboratory-based education and teaching [4]. Many universities have started to use discipline competitions as a driving force to explore ways of cultivating talent in landscape architecture and as an important way to evaluate the effect of innovation education in recent years. Open laboratories provide students with a platform for developing practical abilities, which can not only effectively improve the utilization rate of experimental equipment but also further enhance students' autonomous learning ability and innovative capacity. Discipline competitions and open laboratories are mutually supportive. Therefore, building open laboratories around discipline competitions is not merely an option but a necessary step forward.

2. Construction Ideas for Open Laboratories in Landscape Architecture Based on Discipline Competitions

Landscape architecture is a highly practical, interdisciplinary, and innovation-oriented field. Therefore, a comprehensive approach characterized by "competition-driven development, open sharing, competency orientation, and collaborative education" has been adopted. The primary goal is to enhance students' innovative practical abilities and overall competence. In order to achieve the above goal, a development framework has been constructed that includes competition-driven demand identification, an experimental platform, open-operation guarantees and competency-enhancement feedback (see Figure 1). First, high-level discipline competitions are used to identify the knowledge, skills, tools, and resources required for students' professional development, and laboratory functions and resources are designed and allocated accordingly. Second, by focusing on cutting-edge trends in landscape architecture design, an open and shared platform is established to integrate teaching and practice, research and innovation, and competition preparation. Third, an open operational mechanism accessible to all students is established, with tiered services provided according to diverse needs, including flexible scheduling, process-oriented guidance, and resource accessibility. This mechanism contributes to enhancing students' autonomous learning capabilities and creative abilities. Furthermore, the development and operation of the laboratory are continuously optimized on the basis of competition outcomes, the quality of students' work, skill assessments, and student feedback. In this manner, a positive cycle is formed in which competitions promote learning, stimulate innovation, and drive development, thereby supporting the cultivation of high-quality, practice-oriented professionals in landscape architecture.

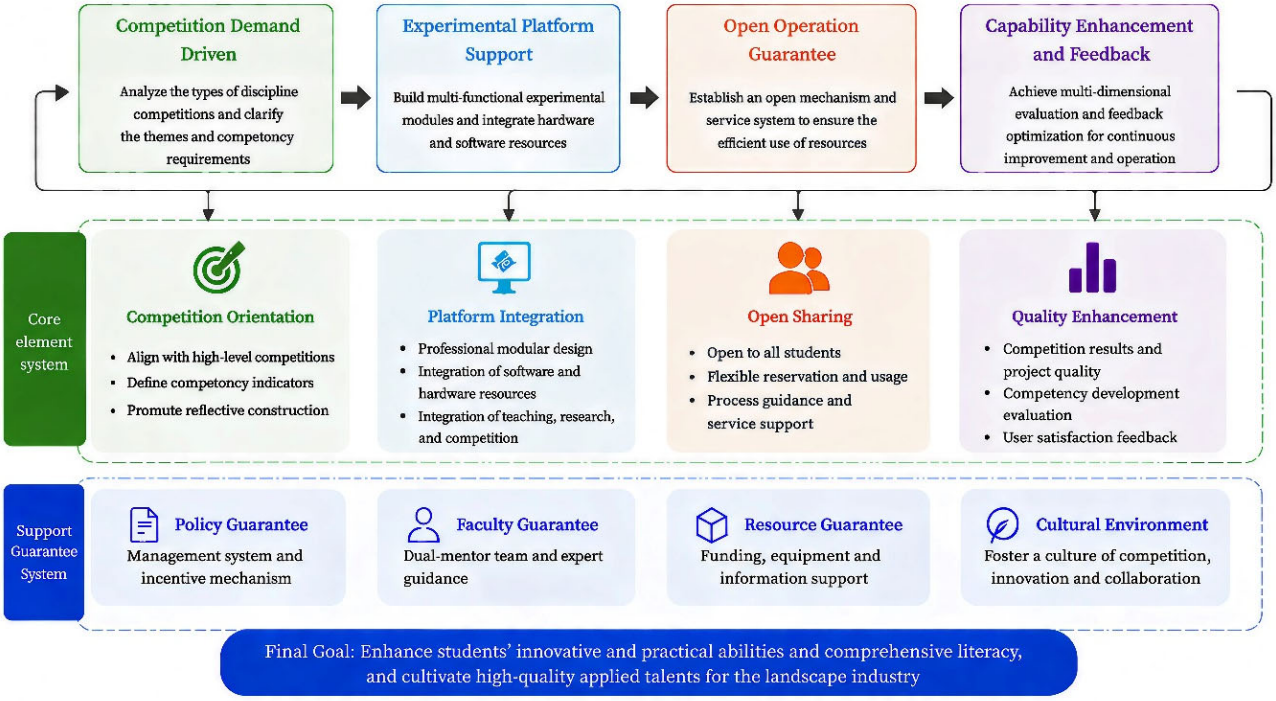

Figure 1. Overall conceptual framework for the construction of an open laboratory for discipline competitions in landscape Architecture

3. Construction Pathways for Open Laboratories in Landscape Architecture Based on Discipline Competitions

3.1. Optimizing the Space Layout of Laboratories

In landscape architecture education, discipline competitions can serve as an important mechanism for improving teaching, promoting learning, and supporting laboratory development. In response to the requirements of these competitions, laboratory spatial layouts should be continuously adjusted and optimized. The construction of open laboratories is therefore intended to create an open platform that integrates teaching practice, competition training, innovative design, and achievement display, while further strengthening students' professional practical competence and innovative capacity.

At Hebei Normal University of Science & Technology, the landscape architecture laboratory currently has some functional spaces for practical teaching ,including landscape planning and design studio, computer-aided design room, drafting room, professional art room, and engineering surveying room. In the development of the open laboratory, its functional spaces are reorganized and refined in response to the requirements of landscape architecture competitions. The landscape planning and design studio mainly supports competition discussions, scheme development, landscape design, case analysis, and team-based collaboration. In the computer-aided design room, students can finish CAD drafting, 3D modeling, rendering, and digital landscape design. Students can work on their landscape sketching, design presentation, and artistic expression in the drafting room and art studios. They try out early design ideas and visual communication here for competitions. In the engineering surveying room, students can do some practical training, suchi as site measurements, topographic analysis, and other engineering-related tasks. Here, students sharpens their field investigation and applied skills. Each lab space already used for regularly teach. Competitions push us to rethink and improve lab's functions. The integrated experimental teaching mode of course teaching, competition training and innovation practice is gradually formed.

3.2. Optimizing the Resource Allocation of Laboratories

The reasonable allocation of resources is the foundation of open labortories' efficient operation. And it's also the foundation for the quality of discipline competitions and scientific research practice. The resources allocation should give consideration to hardware infrastructure, digital technology platforms, basic research data collection, and the building of landscape databases. We should improve the resources service capacity of open laboratories and establish a shared resource platform [5].

Take digital technology platform as a example, we should introduce GIS, 3D modeling, parametric design, and AI technology platforms. For example, we can use GIS to conduct site analysis, ecological assessment, and spatial data research. Software likes SketchUp, Rhino, and Lumion can be used for 3D modeling and visualization. Parametric tools such as Grasshopper can optimize landscape forms and conduct spatial generation analysis. Students can explore AI-assisted design in labs , such as intelligent scheme generation, plant configuration optimization, and rendering of visualizations. As a result, students have the ability to participate in high-level competitions.

With regard to research data collection, the Landscape Architecture Program covers multiple research fields, including ecological environments, plant configuration, landscape planning, and urban renewal, all of which require substantial data support. By drawing on existing open-access data resources and integrating course practice, competition

projects, and research activities, the program gradually establishes a research data foundation that supports students' academic research and participation in discipline competitions.

A general-purpose resource system should be constructed for the construction of the landscape database to meet the needs of landscape architecture education, discipline competitions and research. Case studies of landscape Design, plant landscape data, ecological restoration projects, collections of landscape engineering drawings and competition entries, etc. should be added to the system [6]. Pay special attention to collecting excellent domestic and foreign landscape design case studies, classic planning projects, exemplary competition entries, which may provide valuable references for students involved in scheme design and competition practice.

3.3. Establishing the Open Operation Mechanism of Laboratories

Discipline competitions in landscape architecture are characterized by long project cycles, intensive short-term workloads, high demands for practical competence, and strong reliance on teamwork. Traditional laboratories, however, are usually open only during fixed hours and often lack functional flexibility, making it difficult for them to meet the needs of such competitions. This situation places higher demands on the operation and management of open laboratories and requires them to be used more effectively as shared resources. Based on actual conditions and needs, we introduced an open laboratory running model that needs to make an appointment, have management and tutors' guidance. This model breaks the limits of traditional class schedules. The opening mode of laboratory will be more flexible. Students can apply for lab use time, equipment, and space according to competition requirements that make better resource sharing and efficient use. At the same time, it can ensure the lab resources are used in an orderly and standardized way if we make records of lab usage and collect feedback in the process of project. Teachers can provide professional support with regular guidance, stage reviews, and technical guidance. This makes competition training more targeted and more effective.

For different competition levels, laboratories should open at different levels [7]. International and national competitions need that participants have good innovative design ability, cross-cultural awareness, strong grasp of ecological principles and high-quality design expression ability. For example, the IFLA International Student Landscape Architecture Competition, the China–Japan–Korea Student Landscape Architecture Design Competition, the Yuan Ye Award International Competition for College Students, and the Chinese Society of Landscape Architecture Student Design are all the same in requirements. [8]. Participants need long-term research and design practice. So the lab should offer long-term, flexible opening hours and be managed by an appointment system. Provincial, ministerial, university and college competitions focus on foundational skills, proposal feasibility, and teamwork. The lab can provide regular open hours in combination with course. We also should encourage students to do independent design training after class time. This helps achieve a deep fusion of teaching and competition practice. The school level competition is carried out during the innovation and entrepreneurship week. Through various themed competitions and outcome exhibitions, the school have a good professional practice atmosphere. The enthusiasm of students to participate in the subject competition is also stimulated. Different grades different competitions level to achieve different cultivate goal. For junior students, the main goal is simply to take part and get a feel for it. Middle students should pay attention to system training. As for senior students, they need to win prizes in the competition.

3.4. Standardizing the Open Management System of Laboratories

The management of open labs is standardization and scientization and should take competition grantee as foundation. The management system must consider that the right of lab use, appointment process, open hours, safety operation rules, and emergency management. The system also needs to support both interdisciplinary work and faculty mentoring. When keep the lab running smoothly, students have enough room to innovate and access technical support. The open labs offer landscape architecture students a steady, real-world training environment because of competition drive and system guarantee. This helps the deep fusion of theory and practice. The students' innovation skills, practical abilities, and overall competence have been enhanced. And it provides strong support for discipline construction and high-quality talent training.

3.5. Strengthening Faculty Team Building

A high-level teacher team is the important guarantee for open labs' constriction and discipline competition guidance. We should build a guidance team composed of professional teachers, industry experts and enterprise tutors. The teachers have theoretical knowledge and the industry experts bring practice experience of landscape design, so it combines theory with practice well. Teachers should actively work on labs' construction and competition guidance. By participating in teaching innovation projects, research work, and university-industry collaboration, teacher can enhance their teaching ability. Accordingly, Schools and departments can regularly organized teachers to join in industry training, academic conferences, and company visits. This experience will let teachers more know the discipline competitions trends and emerging technologies about landscape architecture. In addition, by involving senior students in competition guidance and laboratory management, we can ensure the transfer of expertise and the sustained development of the team to further enhancing the laboratory's capacity to foster innovation and practical skills.

3.6. Improving the Competition Incentive Mechanism

A good incentive plan helps both teachers and students take part in lab work and discipline competitions [4]. So, schools should implement different rewards for different competition levels. Rewards such as course credit, scholarships, and funding for innovation projects will continuously encourage students to join innovation and practice activities. Of course, teachers should also be rewarded when they guide students to win the competitions, includes teaching achievement awards, performance assessment, and professional title evaluation. I believe it will stimulate the enthusiasm of teachers to participate in laboratory construction and competition guidance. In addition, schools can create a strong academic and innovation atmosphere by holding excellent work

exhibitions, competition outcome presentations and other academic activities. This forms an educational environment of "Emphasize practice, innovation, and ability". It also helps drive the improvement and development of landscape architecture open laboratories.

4. Initial Effectiveness of the Open Laboratory Construction

In the process of labs' construction, the open labs at Hebei Normal University of Science & Technology have effectively use of its different spaces, such as the landscape planning room, the CAD room, the art studio, and the drafting room. With the help of the open labs, students take part in university or college level competitions during innovation and entrepreneurship week each semester. These competitions include CAD drawing competitions, campus pen drawing competitions, and scheme design competitions. Because of these competitions, students exercise their professional skills, technical operation skills and teamwork ability. At the same time, Students also take part in the annual YuanYe Cup International College Student Competition. They won one first prize, four second prizes, two third prizes, and several honorable mentions between the 2023 and 2025. It evident that the labs have performed in resources support, technical guidance, and competition support. The competition prizes further encourage students to join in more high-level competitions. These achievement laid a foundation for the improvement of open labs mechanism, the optimization of management system and the cultivation of innovative applied talents in landscape architecture.

5. Conclusion

The construction of open laboratories for landscape architecture based on discipline competitions has follow contributes. On the one hand, the open labs effectively integrate teaching resources. It stimulates students' innovative thinking, and enhances their practical skills. On the other hand, it integrates theory teaching and practical training which becomes the foundation for cultivating high-quality applied talents in landscape architecture. The current construction of open labs also provides references of labs' optimization and the development of landscape architecture in the future.

Acknowledgements

This work was financially supported by the Teaching Research Project of Hebei Normal University of Science & Technology (JYZD202206).

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