

Teaching Reform in Plant Landscape Design Courses Based on Project-Driven Approach

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Abstract: Plant landscape design is a crucial discipline within the environmental ecology framework, and mastering its fundamental theories, principles, methods, and skills is of paramount importance to the field of landscaping. However, numerous issues currently exist in plant landscape design courses, including inadequate self-directed learning abilities among students, a lack of practical project experience, and insufficient interdisciplinary integration. Project-driven teaching methodology is a promising approach, this paper explores the necessity of employing project-driven methods in plant landscape design courses and presents practical strategies, including curriculum design, promoting student-initiated learning, emphasizing real-world applications, fostering collaboration and teamwork, and implementing presentation, reflection, and assessment processes. These strategies are anticipated to facilitate improvements in plant landscape design courses, enhance students' practical skills, and develop their overall competence to meet industry demands.

Keywords: Project-driven Method; Plant Landscape Design; Educational Reform; Design Courses; Practical Abilities

1. Introduction

"Planting Design and Landscape" is a discipline within the environmental ecology system that elucidates the fundamental theories, principles, methods, and practical skills of planting design in landscape architecture. Landscape plants are an integral part of urban garden beauty and ecosystems [1]. Mastering the principles and various applications of planting design and landscape has significant implications and practical value for the development of landscape architecture.

However, there are currently numerous issues in practical teaching, such as students' lack of self-learning abilities, insufficient practical project experience, and a lack of interdisciplinary integration.

Project-driven teaching method refers to introducing project cases into the teaching process based on the content of instruction, integrating teaching with practical projects [2]. Task-driven teaching methods emphasize the application of real projects. This means that students will apply their knowledge and skills in actual plant landscaping design projects. This approach can enhance students' practical skills, better preparing them for entry into the professional field. Currently, the project-driven teaching method has been widely used in various courses, such as mechanical design [3], remote sensing [4], landscape design [5,6], landscape planning and design [7], electronic skills training [8], etc.

Scholars have conducted reform research on plant landscaping courses [9], such as combining PBL method with teaching reform [10] and using competitions to promote teaching reform [11]. However, there is limited research on the combination of project-driven methods with plant landscaping courses. This study, based on the project-driven method, analyzes the problems existing in the application of project-driven methods in plant landscaping course teaching. It explores the path of reform for plant landscaping courses and provides valuable insights for teaching. The research results are of great significance for improving students' practical abilities in plant landscaping courses.

2. Current Issues with Project-driven Approaches

Teaching in Plant Landscape Design Courses
Plant landscape design courses may face challenges that impact students' learning

experiences and the development of professional skills. The existing problems include:

The practicality of the current curriculum is not outstanding. The allocation of hours in current plant landscape design courses is too balanced, with 24 hours for theory and 24 hours for practice. The theoretical aspect focuses on concepts and principles, while the limited time for practice neglects actual operations and skill training. Students may feel a lack of practical experience, making it challenging to handle real projects.

Students do not have a good grasp of technical tools. Plant landscape design requires various technical tools, such as CAD software, GIS, virtual reality, etc. However, the execution of projects may require the use of these tools, and previous courses may not provide sufficient training, affecting students' ability to use these tools and potentially hindering project progress. The course has not been integrated across disciplines. Plant landscape design projects often involve multiple disciplines, including ecology, landscape architecture, botany, etc. The current curriculum does not effectively integrate these disciplines, making it difficult for students to understand and apply knowledge comprehensively.

The course has not been integrated across disciplines. Students typically need to apply their knowledge and skills in real projects, but existing plant landscape design courses may not offer enough opportunities for involvement in actual projects. This limitation could hinder their professional development, making it challenging to apply theoretical knowledge to practical situations.

3. Necessity of Applying Project-Driven

Teaching in Plant Landscape Design Courses
Plant landscape design is a highly practical discipline, requiring students to apply theoretical knowledge in real projects. Through the project-driven method, students have the opportunity to participate in actual

plant landscape projects, gaining valuable practical experience. This helps them understand the practical challenges of plant selection, landscape design principles, budget management, etc., enhancing their professional competence. Additionally, plant landscape design involves multiple disciplines, including botany, ecology, landscape design, and art. The project-driven method encourages students to integrate knowledge from these different fields to solve complex problems in actual projects, fostering interdisciplinary comprehensive abilities to meet industry demands. Plant landscape design is a creative discipline, and the project-driven method encourages students to propose innovative design concepts and solutions. By participating in real projects, students face different challenges and client demands, stimulating their creativity and fostering independent thinking and innovation. The project-driven method often involves interaction with industry partners, helping students establish connections with the plant landscape design industry. Students can collaborate with professional designers, plant experts, construction teams, etc., gaining insights into the industry's latest trends and best practices while building their professional network. The project-driven method emphasizes solving real-world problems, which is crucial for plant landscape design. Students need to consider issues such as sustainability, environmental protection, resource management, preparing them for future plant landscape projects.

4. Practical Application of Project-Driven

Teaching Method in Plant Landscape Design Courses
As shown in Figure 1, addressing the current issues in project-driven teaching in plant landscape design courses, this paper proposes solutions through curriculum design, encouraging active student learning, applying theoretical knowledge to real situations, collaboration and team presentations, reflection, and assessment.

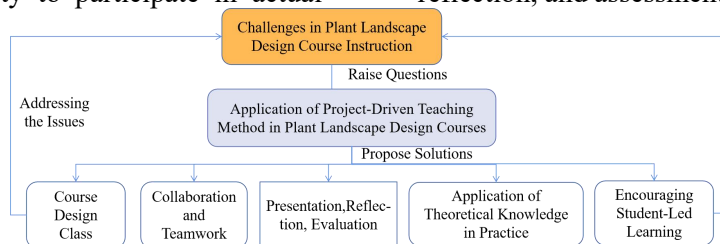


Figure 1. Research Framework

4.1 Curriculum Design

In designing the course, it is crucial to first define the learning objectives. The teaching objectives of the course are as follows, in terms of theory to understand the principles of plant configuration and master the principles of plant configuration in landscape design. In terms of cultivating students' ability objectives, cultivate students to have the ability of plant landscaping, and require students to master the architecture and plant configuration, plant configuration of waterfront, road plant configuration, terrain plant configuration, vignette plant configuration, stone landscape plant configuration, and three-dimensional greening. Cultivate students to have the ability to draw plant configuration construction drawings, and instruct students to master the method of plant configuration construction drawings. In the method of quality education, through project-driven teaching, cultivate the courage to pursue plant landscaping, cultivate creative thinking and innovative consciousness. Cultivate the spirit of truth-seeking, rigorous and realistic scientific attitude and the style of hard work. To provide guidance on the specific content and activities of the program by identifying students to define teaching objectives.

To address the issue of insufficient practical time, the curriculum design emphasizes the importance of hands-on experience by allocating more hours to practical learning. The plant landscape design course focuses on projects rather than textbooks or classroom lectures. In the curriculum design, a project-driven approach is adopted, allowing students to explore and understand the subject matter through practical projects. For example, this course centers around a campus plant landscape project, leveraging students' familiarity with the current campus landscape environment to facilitate teaching practices. Through problem-driven methods, students are encouraged to investigate campus plant landscaping, develop the ability to pose questions, analyze, and propose solutions.

4.2 Encouraging Student-Led Learning

To address the issue of students not mastering software technologies such as CAD and GIS, there is encouragement for students to engage in post-class exercises. Websites for self-

learning (e.g., "I want to self-learn" website) are recommended to students for studying and reinforcing relevant software skills after class. Students take on active roles in projects, requiring them to actively participate in research, experiments, surveys, and other learning activities, rather than passively receiving information. Encouragement and guidance are provided during the teaching process to ensure active student involvement. To help students identify learning resources, the course instructor recommends websites related to plant landscape design (Table 1), allowing students to expand their knowledge beyond the course curriculum.

Table 1. Websites Related to Plant Landscape Design Studies

Platform and Website URL	Website Content
Coursera (https://www.coursera.org/)	Coursera offers numerous online courses from universities and institutions, including courses related to plant landscaping and horticulture. Students can search for courses relevant to their interests and choose those that align with their preferences and schedules.
edX (https://www.edx.org/)	edX is also a platform that provides online courses, collaborating with many world-class universities. Students can find courses related to plant landscaping on edX and tailor their learning according to their needs.
YouTube (https://www.youtube.com/)	There are many free plant landscaping tutorials and video courses available on YouTube. Students can search for tutorials on plant landscaping, gardening techniques, and landscape design to access educational content on these topics.
Horticulture and Gardening Association Websites	Many horticulture and gardening associations provide information and resources related to plant landscaping and gardening. Students can browse the websites of these associations to find articles, guides, and training materials on plant landscaping.

To address the lack of interdisciplinary integration, stimulating students' proactive learning can lead to significantly improved results. Project-based teaching often involves interdisciplinary content because solving real-world problems typically requires knowledge and skills from multiple disciplines. Therefore, in addition to learning the content of this

course, students need to supplement their knowledge in areas such as ecology, art design, architecture, etc. This can be achieved by offering cross-disciplinary elective courses to broaden students' knowledge.

4.3 Application of Theoretical Knowledge to Practical Scenarios

Project-based teaching emphasizes the practical application of learning, helping students connect their acquired knowledge and skills to real-world problems. Traditionally, there has been a disconnect between theoretical knowledge and its practical application. Project-based teaching addresses this issue by using a campus plant landscape project as an entry point, allowing students to apply theoretical knowledge. Through project-based training, students enhance their ability to analyze site issues, providing opportunities for them to participate in real projects and bridge the gap between theory and practice.

The practical application of plant landscaping design theory involves various aspects, including design principles, plant selection, spatial layout, ecological considerations, and maintenance management. Here are some steps and considerations for applying plant landscaping design theory to real projects: Before starting the design, understanding the project's goals and requirements is crucial. Collaborate with clients or project teams to determine the purpose, functions, and expected outcomes of landscape design. Conduct a detailed analysis of the design space, considering topography, soil, climate, and surrounding environment. Identify the use of different areas, such as recreational areas, gardens, and pathways. Select suitable plants based on design goals, climate, soil conditions, and maintainability. Consider the growth characteristics, colors, textures, and seasonal changes of plants, as well as their spatial arrangement. Integrate plants and other landscape elements organically into the design using principles such as balance, symmetry, repetition, and proportion. Ensure that the overall layout and structure meet the space requirements and provide a pleasant aesthetic. Consider the ecological impact of plant landscaping, including water resource management, soil protection, and the use of local plants to promote ecological balance. Use sustainable design and management practices

to reduce environmental impact. If the design includes water features such as ponds or streams, pay special attention to water feature design. Ensure the fluidity, water quality, and coordination with surrounding plants. Develop a detailed maintenance plan to ensure the health of plants and the long-term sustainability of the landscape. Consider the maturity stages of plants and plan for regular pruning, watering, and fertilization. Communicate with community members during the design process, gather feedback, and consider collective needs. Community involvement can enhance the acceptance and sustainability of the design. Utilize modern technological tools such as computer-aided design (CAD), simulation software, and virtual reality (VR) to better showcase and adjust the design. Ensure that the design scheme fits within a feasible budget and allocate resources reasonably. Consider the growth rate of plants and the project timeline for proper planning and resource allocation. By considering these factors comprehensively, applying plant landscaping design theory to real projects can create landscapes that are beautiful, practical, ecologically friendly, and maintainable.

4.4 Collaboration and Teamwork

Project-driven teaching encourages students to collaborate with their peers, often requiring them to work together to complete projects. This fosters the development of teamwork, communication, and conflict resolution skills. In the process of conducting campus plant landscape design, students are encouraged to form teams, allowing them to build and coordinate teams through practical activities. This helps students leverage their strengths within the team, address challenges in the solution design process, and cultivate a spirit of teamwork, achieving educational goals.

Assign different roles within the team, such as project manager, designer, plant specialist, etc. By assigning specific responsibilities to each member, students can be motivated to collaborate better and utilize their individual expertise. Encourage students to share information and resources. This can be done through online platforms, team meetings, or shared documents. The exchange of information and sharing of resources among team members helps the whole team to learn and develop. In addition arrange regular team

meetings to give students the opportunity to discuss the progress of the project, solve problems and make suggestions. This helps to enhance communication and collaboration and ensures that the team is moving in the right direction. Team members are encouraged to make collective decisions, especially when it comes to key aspects of the project. In this way, students will learn to listen to others, present their ideas, and reach consensus as a team. If possible, encourage interdisciplinary collaboration between the Plant Landscaping program and other disciplines. For example, work with students in fields such as architectural design, ecology, or sociology to foster collaboration among students from different professional backgrounds. Arrange field trips to give students hands-on experience with the realities of plant landscaping. During field trips, students can work together to observe, gather information, and discuss and solve problems as a team.

4.5 Presentation, Reflection, and Evaluation

After completing a project, students typically showcase their achievements and reflect on their learning experiences. When presenting their work, students provide background information on the project, including its goals, location, schedule, and budget. Ensuring that the audience understands the project's context and scope is crucial. Detailed presentations cover plant selection, landscape design, and planning. Visual aids and diagrams help the audience understand the project's appearance and structure. Audience engagement is encouraged by inviting questions and discussions on various aspects of the project. Students are prepared to address any questions about the project. In the final presentation, key information is summarized, recommendations and next steps are proposed to ensure the project's successful implementation and maintenance. Displaying works and reflecting on them deepens understanding of the learned content and enhances self-awareness.

Project evaluation typically focuses not only on the final results but also on students' performance throughout the project. This includes assessments of their collaboration, research, and problem-solving abilities. The assessment method for plant landscape design based on the project-driven approach aims to evaluate the success of the plant landscape

engineering through the actual implementation and outcomes of the project. Key steps and considerations include: Clearly defining goals and indicators for the project. Evaluating the planning and design stages, ensuring alignment with project goals. Monitoring project costs and resource usage to ensure budget and resource allocation appropriateness. Assessing the implementation process, including plant planting, landscape construction, and maintenance. Collecting feedback and effect measurements from project stakeholders, such as clients, residents, or users. Evaluating the project's sustainability, including water resource management, ecological balance, and the degree of environmental practices.

Based on the evaluation results, an action plan is developed for project correction and improvement. This may involve adjusting plant selections, enhancing maintenance measures, or improving landscape design. Plant landscape evaluation ensures that projects not only meet aesthetic requirements but also achieve expected environmental, social, and economic goals. This approach emphasizes tangible outcomes and assists in continuous improvement and optimization of plant landscape practices while assessing the effectiveness of student learning experiences.

5. Conclusions

In plant landscape design courses, the project-driven teaching method is inherently essential. This approach enhances students' practical skills, interdisciplinary integration, and innovation, helping them establish connections with the industry. The current curriculum faces challenges, including students' poor self-learning abilities, lack of practical project experience, and insufficient interdisciplinary integration. Therefore, the application of project-driven teaching in plant landscape design courses holds significant reform significance. Reforms should focus on curriculum design, encouraging active student learning, practical application, collaboration and teamwork, as well as presentation, reflection, and evaluation to improve students' overall qualities and professional readiness.

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References

- [1] Cheng Guohua, Wang Sa, Yang Zhi, Zhao Xiyin. Current Status and Reform Discussion on Teaching of Landscape Plant Configuration and Landscaping Courses. *Journal of Hefei Normal University*, 2023, 41(03): 135–138.
- [2] Xiong Wei. Research and Practice of Java Programming Fundamentals Based on Project-Driven Teaching. *China Educational Technology Equipment*, 2023(02): 80–82.
- [3] Fan Lina. Application of Project-Driven Teaching Method in Mechanical Design Teaching. *Shanxi Youth*, 2023(03): 69–71.
- [4] Zhao Qiang, Zhou Yueling, Liu Changyu, Xie Huaming, Zhu Shuguang. Application and Evaluation of Project-Driven Teaching Method in Remote Sensing Courses. *Surveying and Spatial Information Sciences*, 2022, 45(04): 10-13+17.
- [5] Jiang Weiping. Application of Practical Project-Driven Teaching Method in Practical Teaching of Landscape Design Courses. *Art Education*, 2014(12): 178.
- [6] Chen Sa. Reexploration of Project-Driven Landscape Design Course Teaching Methods. *Popular Standardization*, 2019(12): 203+205.
- [7] Zhang Yingchun. Analysis of the Application of Project-Driven Teaching Method in Practical Teaching of Landscape Planning and Design Courses. *Curriculum Education Research*, 2019(05): 251.
- [8] Kang Aimei. Application and Analysis of Task-Driven and Project Teaching Method in Electronic Skills Training Teaching. *Electronic Components and Information Technology*, 2022,6(03): 220–222.
- [9] Bai Yuchen. Ideological and Political Teaching Strategies for Landscape Plant Landscaping Courses. *Modern Horticulture*, 2023,46(18): 199–201.
- [10] Chen Ting. Application of PBL Teaching Method in Blended Teaching Mode - A Case Study of "Plant Landscaping Design" Course in Higher Vocational Education. *Education and Teaching Forum*, 2023(28): 169–173.
- [11] Tian Zhiguo, Wang Shuyu, Yang Yan. Teaching Practice of Landscape Plant Landscaping Course under the "Learn through Competition" Model. *Agriculture and Technology*, 2022, 42(11): 184–186.