

Research on the integration of project-based teaching design and academic competitions in architectural education under the background of new engineering

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Abstract: This study addresses the reform of architectural education under the new engineering background, exploring the integration strategies of project-based teaching design and academic competitions, aiming to enhance the practical and innovative abilities of architecture students. The paper analyzes the connection between architectural professional education and academic competitions, as well as the interplay between project-based teaching and academic competitions, focusing on improving students' innovative abilities, teaching quality, participation, and fairness. The research constructs a comprehensive evaluation system framework to ensure the consistency of evaluation criteria with teaching and competition objectives and proposes implementation steps to optimize teaching and learning experiences.

Key words: project-based teaching in architecture; academic competitions; innovative abilities; comprehensive evaluation system

1 Introduction

Against the backdrop of today's rapidly developing era, new engineering education, as an important direction of higher education reform, has put forward new requirements for the cultivation of talents in traditional engineering majors such as architecture. Therefore, this paper aims to explore the importance of the integration of project-based teaching design and academic competitions in architectural education under the new engineering background for enhancing the practical and innovative abilities of architecture students, and proposes corresponding teaching reform measures to provide strong support for the cultivation of high-quality, composite talents that meet the future needs of the construction industry.

2 Project-based teaching model combining theoretical knowledge and practical skills

Project-based teaching typically revolves around a specific architectural project, where students, under the guidance of teachers, complete the entire process from project planning, design, construction, to management. This teaching model helps students understand the application of theoretical knowledge in actual work. Students will enhance their technical abilities through hands-on operations, such as model making, computer-aided design (CAD), building information modeling (BIM), etc. Project-based teaching encourages students to innovate and research during the project implementation process. Students need to explore new design concepts, technologies, and materials to address various

challenges encountered in the project. At different stages of the project, teachers and industry experts will provide feedback to help students evaluate and improve their work. This continuous feedback mechanism helps students adjust their learning strategies in a timely manner and improve the project quality. Project-based teaching is often combined with the actual needs of the construction industry, allowing students to learn and work in a real industry environment through cooperation with enterprises, thus achieving a deep integration of education and industry.

3 The role of project-based teaching in building a new model for talent cultivation

Some universities have integrated professional competitions into the architectural design curriculum by creating "competition topics" and establishing specialized teaching teams. With the goal of cultivating applied talents with innovative awareness, practical abilities, and comprehensive qualities, they have built a new model for architectural professionals cultivation centered around academic competitions. This model not only optimizes the teaching design system and promotes curriculum teaching model reforms but also improves teaching quality, providing architecture students with broader development opportunities and more practical experiences.

4 Constructing a design series curriculum system for academic competitions and project-based teaching

4.1 Systematically organizing academic competitions suitable for project-based teaching

It is necessary to systematically organize and clarify the training objectives and teaching orientation of the architecture major from the first year to the fifth year, and plan detailed course content, design areas, and expected learning outcomes for each semester. In the teaching practice of the School of Architecture at Tsinghua University, the training objectives are divided into four stages: basic skill development, deepening of professional knowledge, enhancement of design capabilities, and development of innovative thinking. For each stage, the course content covers a gradual deepening from basic drawing, architectural design principles to advanced architectural design studios. In terms of curriculum design, the school refers to internationally renowned competitions such as the International Union of Architects (UIA), Student Architectural Design Competition and the American Institute of Architects (AIA) as well as Student Design Competition. It selects competition themes that match the course objectives, such as sustainable architectural design and historical building preservation, as "project-based" teaching units, and embeds them into the corresponding semester's curriculum. In this way, students can apply the knowledge they have learned to solve practical problems during the competition process, thereby enhancing their comprehensive design capabilities.

4.2 Implementation of project-based teaching

A teaching system centered around project-based subject competitions is constructed, where each course in the architecture program at universities will set up a course project system around competition themes [1].

The College of Architecture and Urban Planning at Tongji University encourages students to participate in the "Challenge Cup" competition, a large-scale subject competition themed around technological innovation. The college integrates the competition with course design. For example, in the "Urban Design" course, teachers guide students in conducting urban design research projects according to the requirements of the "Challenge Cup". Students are required to propose innovative urban design schemes and prepare corresponding research reports and presentation materials. These projects are often combined with the end-of-term design assignments, allowing students to prepare competition entries while fulfilling course requirements [2].

4.3 Establishing a comprehensive evaluation system

(1) Feedback and improvement

- Self-reflection: Assess whether students can reflect on the project process and outcomes, and propose measures for

improvement.

- Peer review: Collect feedback through peer evaluation as part of the assessment.

(2) Implementation steps

• Develop evaluation scales: Based on the above criteria, develop specific evaluation scales with clear scoring details for each evaluation dimension.

• Diversify evaluation entities: Include teacher evaluations, peer reviews, self-assessments, and competition judges' evaluations.

• Combine formative and summative evaluations: Conduct formative evaluations during the project process to provide feedback and guidance; conduct summative evaluations at the end of the project to assess the final outcomes.

• Continuous improvement: Continuously optimize evaluation criteria based on evaluation results and student feedback to enhance teaching quality and learning experiences.

5 Conclusion

Academic competitions not only provide students with a stage to showcase their design talents but also serve as a reflection of the quality of education. Integrating academic competitions into the teaching system can effectively combine teaching with practice, allowing students to directly participate in competition projects during their coursework. At the same time, a comprehensive evaluation system that covers various dimensions such as the achievement of teaching objectives, satisfaction of competition requirements, project implementation process, outcome presentation and expression, comprehensive qualities, and feedback and improvement has been established, ensuring the comprehensiveness and effectiveness of the evaluation. This, in turn, creates broader development opportunities and richer practical experiences for architecture students, laying a solid foundation for cultivating architectural professionals who meet the demands of the new era.

Acknowledgments

This paper is based on the general project of the school-level teaching reform research project of Binzhou University in 2023-- "Teaching reform of architectural design series courses combined with design competition and engineering practice".

Conflicts of interest

The author declares no conflicts of interest regarding the publication of this paper.

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