Curriculum and Teaching Methodology (2025)
Clausius Scientific Press, Canada

DOI: 10.23977/curtm.2025.080701
ISSN 2616-2261 Vol. 8 Num. 7

Innovative Practice of Architectural Design Courses Based on School-Enterprise Cooperation

Yiyang Zhao

College of Intelligent Science and Engineering, Xi'an Peihua University, Xi'an, 710100, Shaanxi, China

495236574@qq.com

Keywords: School-Enterprise Cooperation; Architectural Design Courses; Practical Teaching; Curriculum Innovation; Talent Training

Abstract: Current architectural design courses face widespread practical challenges, including insufficient hands-on skills, a disconnection from real-world project examples, and a limited evaluation system. These challenges make it difficult to meet the industry's demand for application-oriented and innovative talent. This paper aims to innovate the architectural design curriculum through a school-enterprise collaboration model, enhancing students' comprehensive skills and project-based competence. The research methodology includes: first, establishing a joint school-enterprise teaching team to jointly develop the course syllabus and training objectives; second, introducing real-world enterprise projects as course examples, with students working in groups to complete scheme design, modeling, and construction drawing production; third, establishing a phased evaluation mechanism, including classroom performance (20%), scheme innovation (30%), technical application ability (30%), and comprehensive assessment by the enterprise mentor (20%); fourth, collecting student feedback through questionnaires and interviews, and analyzing teaching effectiveness based on performance data. Results show that the accuracy of construction drawings for students participating in this course increased to 92%, the scheme pass rate increased to 93%, and student satisfaction reached 96%. The average score of the students' professional competence given by the enterprise mentors is 4.5 out of 5. Teaching innovation through school-enterprise cooperation has effectively addressed the disconnect between traditional courses and industry needs, significantly enhancing the development of students' practical and innovative abilities, and providing a replicable path and empirical reference for reforming architectural courses.

1. Introduction

Architectural design courses play a crucial role in connecting the past and the future within university training systems. However, in practice, the course content and training methods remain limited, often confined to theoretical explanations and drawing exercises. Students' design proposals often lack interaction with real-world engineering scenarios. This limitation leads to significant deficiencies in students' practical skills, design logic, and comprehensive grasp of project implementation. Course outcomes struggle to translate directly into the practical skills required by the industry, and this disconnect between teaching and practice has gradually become a significant bottleneck restricting the quality of talent development.

Against this backdrop, building a curriculum system based on a school-enterprise collaboration model is of particular significance. Jointly designing teaching objectives and case studies by both schools and enterprises effectively introduces real-world industry projects and integrates them into the classroom, allowing students to gain real-world training experience during their learning process. A phased, multi-dimensional evaluation mechanism not only comprehensively measures student performance, innovative solutions, and technical capabilities but also helps teachers adjust teaching strategies in a timely manner, ensuring a close connection between course content and industry developments. This approach not only enriches the teaching process but also provides a path for cultivating design talent with practical skills and a sense of innovation.

This paper will be elaborated from the overall structure: the first part is the introduction to introduce the research background and problem, the second part is a review of related work, existing research and shortcomings, the third part explains the proposed cooperative teaching method and implementation path, the fourth part presents the experimental results and discusses them in combination with student and tutor feedback, and the fifth part summarizes the research conclusions and proposes further improvement directions.

2. Related Work

As a professional field with strong practicality, innovation in teaching methods has always been the key to improving the quality of talent training in architectural design courses. Different scholars have explored from the perspectives of course structure, project introduction, and technology application, and have formed rich and diverse research results. Liu studied the innovative teaching methods of ceramics in secondary vocational architectural design courses to provide reference for relevant colleges and universities [1]. Cao et al.carried out classified training by semester stage, stage project, project task, and task content based on the personalized needs of students, so that the "Architectural Design" course project teaching can achieve the mutual integration of "production, teaching, learning, research, competition, and creation", providing a reference for the innovation and practice of the project teaching model of higher vocational architectural design courses [2]. Long et al. reshaped the course teaching results and fully demonstrated the new teaching methods of future-oriented residential buildings, which has significant inspiration for the teaching of similar schools and the wider practice of residential building design [3]. Yue fully integrated digital concepts and technologies, and explored in depth the methods and strategies for the innovation of digital teaching forms from seven aspects, including optimizing teaching design, building teaching resources, expanding teaching methods, creating new teaching materials, developing virtual simulation training projects, improving teaching evaluation, and innovating the forms of teaching results display and exchange [4]. Cao et al. used the "three-in-one", BIM-driven, and collaborative education methods to achieve the goal of cultivating morality and educating people in the construction of the architectural design curriculum system [5]. Through the combination of work and study, and school-enterprise cooperation, the teaching content is integrated with the requirements of architects' professional positions, the curriculum setting is integrated with professional standards, and qualified architectural design professionals are cultivated. Qureshi aimed to test a studio teaching method derived from the collaborative design studio experiment of two architectural departments, and used it as an effective way for students to learn from each other [6]. Saghafi explored strategies for linking knowledge acquisition and knowledge application in design studio teaching [7]. Auernhammer and Roth outlined the origins and evolution of one of the most influential design thinking perspectives in the field of innovation management [8]. Burton and

Salama analytically described recent global efforts to enhance excellence in architectural education by achieving sustainable development goals [9]. De and Alves elaborated on the relationship between learning space and improving student engagement and enhancing teacher-student interaction [10]. Domestic and foreign research provides multi-angle ideas on curriculum innovation, the integration of teaching methods and practice, and lays a theoretical and practical reference foundation for this paper to carry out research on architectural design curriculum reform in the context of school-enterprise cooperation.

3. Method

3.1 Teaching Model Construction

The teaching model of this course is centered around school-enterprise cooperation. The university's School of Architecture and its partner companies jointly establish a teaching team. Teachers in the team are responsible for the theoretical framework and academic depth, while corporate mentors are responsible for engineering logic and industry standards. The two teams repeatedly consult on teaching objectives and training directions to form a unified plan. During the compilation of the course outline, real projects are used as the axis, connecting the design foundation, scheme conception, model construction, construction drawing, and post-production presentation into a complete process. At each stage, tasks and assessment standards are jointly set by school teachers and corporate mentors. To ensure that the course keeps up with industry trends, companies provide actual construction projects implemented in the past three years as cases and simplify them appropriately to ensure that students can complete the entire process within a limited teaching cycle. The teaching team embedded project research, functional analysis, design reporting, and construction drawing review into the course, allowing students to experience a working state that is highly similar to the corporate engineering environment in a classroom environment [11]. Students receive regular guidance from corporate mentors while completing tasks in groups, and report on their achievements at key points. Both the school and the enterprise jointly propose revisions, and after multiple rounds of feedback, the rationality and innovation of the plan are gradually improved. To enhance the learning effect, the course also includes a results review link that aligns with corporate standards. All groups present their achievements at a unified review site. The review criteria include drawing accuracy, spatial rationality, innovative expression, and feasibility. The results are directly used as the basis for course evaluation. Through this model, the course achieves a deep integration of theoretical teaching and engineering practice, enabling students to complete the complete architectural design process driven by real scenarios and gradually develop professional qualities and professional capabilities that are highly aligned with corporate needs.

3.2 Introduction of Enterprise Projects

The corporate projects introduced in the course are from actual engineering cases recently undertaken by cooperative units, covering two types of buildings: public buildings and residential buildings. The companies provide complete owner demand descriptions, site conditions, functional zoning and basic technical indicators as the task book. University teachers and corporate mentors moderately compress and simplify the original projects based on the course duration and student capabilities, retaining key elements to ensure authenticity. After receiving the task book, students are assigned roles in groups of 4 to 6 people. There are job positions such as project leader, modeling execution, construction drawing, data collation and report presentation. The whole process of the task is completed by simulating internal collaboration within the enterprise. During the project, the team needs to survey the site and conduct data research to form preliminary plan and three-dimensional concepts, and then submit the plan to the joint review meeting of the school and enterprise. After receiving modification opinions, the model is deepened and the details are optimized. The modeling phase requires the realization of three-dimensional presentation in a BIM environment. The data must meet the accuracy standards for exporting construction drawings. The construction drawing phase requires students to complete architectural plan, elevation, section, node details, material descriptions, and technical briefing documents. All results must comply with current national standards and corporate drawing specifications [12]. In order to enhance practical application, the course has periodic reporting meetings. The team must present their progress to the corporate mentor and teacher within a limited time, accept opinions and make iterative updates. The final results are presented in a unified review. Both the school and the enterprise will score based on design logic, digital expression, construction feasibility, and spatial innovation, and use them as the basis for course grades.

3.3 Phased Evaluation System

The student performance is divided into four dimensions: classroom performance, solution innovation, technical application ability, and comprehensive evaluation by enterprise mentors. Classroom performance accounts for 20%, and is mainly scored through attendance, timeliness of task completion, participation in classroom discussions, and contribution to teamwork, to ensure that students remain actively involved in daily learning; solution innovation accounts for 30%, focusing on the original thinking and uniqueness of spatial expression in students' design concepts. It requires that the submitted solutions can show novel formal language and independent design logic under the premise of reasonable functions, and are scored through stage results display and expert review; technical application ability accounts for 30%, and the results are determined through a comprehensive inspection of modeling accuracy, construction drawing standardization, BIM technology mastery level, and material process expression ability. This link requires students to submit complete construction drawings and three-dimensional model files, and objectively evaluate the completeness of the files and their compliance with industry standards through spot checks [13]. The comprehensive assessment by the company mentor accounts for 20%. During the project guidance and final review, the company mentor will provide an overall evaluation of the student's performance, focusing on professional attitude, task execution efficiency, communication skills, and career adaptability in a real-world engineering context. The company mentor will combine feedback from multiple people to form an average score to ensure the fairness and authenticity of the assessment results. The entire evaluation process will require students to go through four time points: initial task assignment, mid-term review, results presentation, and final defense. Each stage will receive corresponding feedback and revision suggestions, and scores will be gradually accumulated at different stages, ultimately forming a complete report card.

3.4 Data Collection and Analysis

During the course implementation, a systematic data collection and analysis mechanism is established, encompassing both subjective student feedback and objective data on teaching outcomes. The questionnaire design covers four dimensions: course content relevance, enterprise project difficulty, classroom interaction quality, and personal development. Each item is scored on a five-point scale to ensure data comparability and statistical validity. Interviews are conducted jointly by faculty and enterprise mentors, using a semi-structured approach to record students' difficulties and gains during project implementation. Key issues and positive feedback are summarized using text coding and frequency statistics. Regarding performance data, each student received a clear score for classroom performance, project innovation, technical application ability, and overall assessment by the enterprise mentor. The research team compares the 100-point scale scores with questionnaire satisfaction and conducts correlation analysis to explore the consistency between different evaluation dimensions and student feedback [14-15]. To ensure the reliability of the conclusions, a double check is used during the data analysis process. Two researchers independently enter and compare the results. Any discrepancies are then rechecked against the original data to eliminate human error. This method not only provides a true understanding of students' attitudes towards the curriculum innovation but also clearly demonstrates the actual effects of the teaching reform through quantitative data. Table 1 shows a partial display of the data collection results:

Table 1: Part of the collection results

Student ID	Average Score	Questionnaire Satisfaction (%)	Technical Application Score	Creativity Score
01	85	90	88	84
02	78	82	75	80
03	92	95	94	91
04	88	89	86	87
05	81	85	79	83

4. Results and Discussion

4.1 Accuracy of Student Construction Drawings

In the research arrangement to verify the effect of curriculum reform, a total of 32 students majoring in architecture of the same grade are selected, of which 16 are assigned to the experimental group to directly participate in the school-enterprise cooperation course, and the remaining 16 are assigned to the control group to continue to receive traditional classroom teaching. Teachers and enterprise mentors jointly design a unified assessment task, requiring the two groups of students to complete a set of architectural construction drawings according to the same design requirements within a limited time. The contents include plan and elevation drawings, node details and material markings, and industry standards are used as the accuracy judgment standard. The scoring process is completed by three independent review experts, who score based on four indicators: drawing line specifications, dimensioning accuracy, proportional consistency and detail expression clarity. The weighted average of each score is used as the accuracy result. Figure 1 shows the accuracy comparison results of the construction drawings:

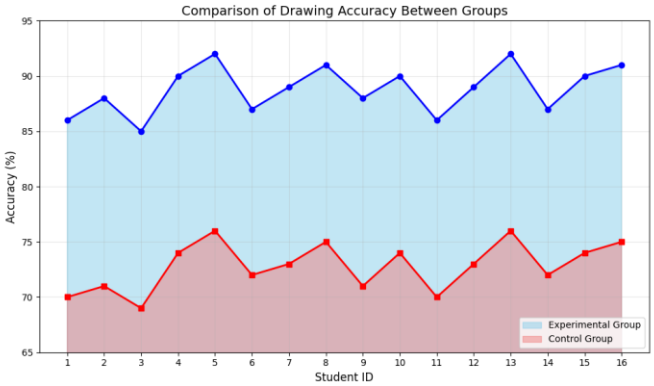

Figure 1: Comparison of construction drawing accuracy

The experimental group achieves scores ranging from 85% to 92%, demonstrating stable performance across the board and generally meeting industry standards. The control group, however, fluctuates between 69% and 76%, experiencing issues with dimensioning and node drawing accuracy. The overall performance of the experimental group significantly improves compared to the control group, demonstrating that the school-enterprise collaboration curriculum significantly improves the accuracy and standardization of students' construction drawing skills. This also demonstrates that long-term exposure to enterprise standards and feedback mechanisms plays a crucial role in cultivating students' ability to grasp detail.

4.2 Program Approval Rate

A unified standard is set for the scheme review phase. A review panel composed of on-campus teachers and corporate mentors scores and judges the design schemes submitted by students. Each scheme must meet the three conditions of functional rationality, spatial logic, and innovative expression to be considered "approved." Figure 2 shows the data results of the scheme pass rate:

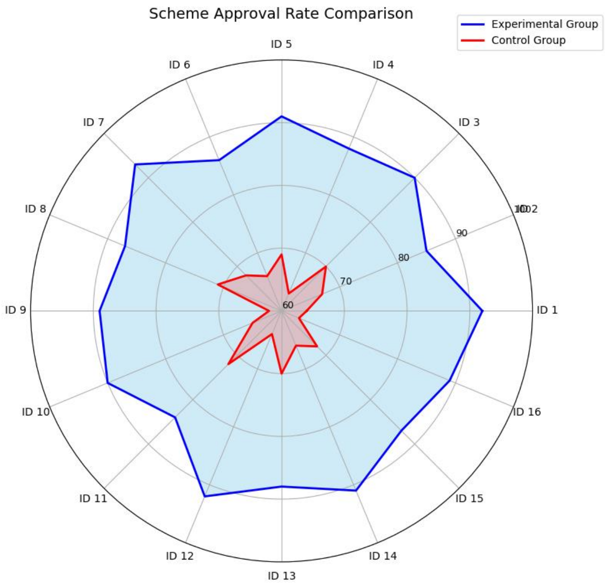

Figure 2: Program pass rate results

Most students score between 84% and 93%, demonstrating the robustness of the program's quality assurance following the course intervention. However, the control group's pass rate fluctuates significantly, ranging from a low of 62% to a high of 72%, a gap of over 10 percentage points. This reflects widespread weaknesses in the program's logic and innovation. Further analysis reveals that while individual students in the experimental group occasionally performed below average, they still outperform the majority of students in the control group, demonstrating that process feedback and the joint school-enterprise evaluation mechanism effectively reduce the risk of failure. While a few students in the control group approached excellence, this lacks consistent overall improvement, demonstrating isolated individual differences.

4.3 Student Satisfaction

During the feedback phase of the course implementation survey, student satisfaction is assessed using a questionnaire. The statistical dimensions cover four aspects: learning experience, reasonableness of task difficulty, teacher and mentor support, and matching of outputs. The full score is 100%, and a score exceeding 80% is considered "satisfied." Figure 3 shows a comparison of student satisfaction:

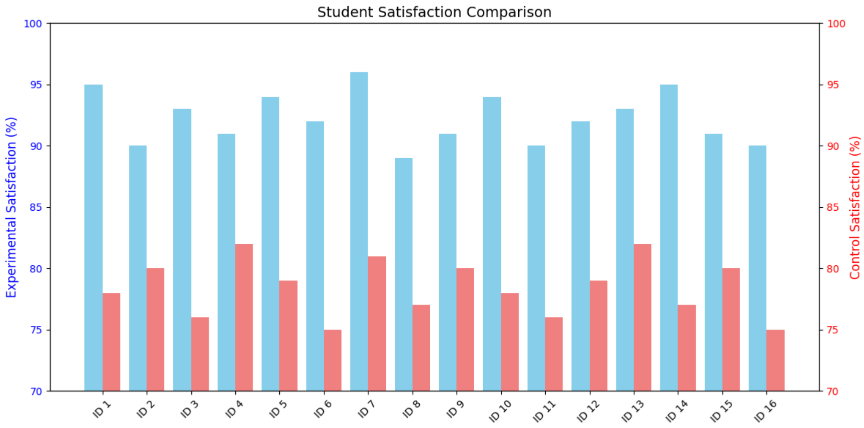

Figure 3: Student Satisfaction

Satisfaction in the experimental group ranges from 89% to 96%, with the highest score occurring in student 07, at 96%, and the lowest score occurring in student 08, at 89%. The inter-group differences are minimal, indicating strong consistency and widespread acceptance of the course across individuals. The difference between extreme values is only 7 percentage points, demonstrating the stability and balance of the model. The control group, on the other hand, ranges from 75% to 82%, with the highest score occurring in students 04 and 13, at 82%, and the lowest score occurring in students 06 and 16, at only 75%. Comparing the extreme values between the two groups reveals that while there are some relatively high-satisfaction individuals in the control group, the overall average level and distribution significantly lag behind those of the experimental group.

5. Conclusion

This study, applying a school-enterprise collaboration model to architectural design courses, demonstrates that incorporating real-world enterprise projects into the classroom not only aligns students' learning with industry needs but also fosters a deeper alignment between teaching objectives and professional competency requirements. The collaborative teaching team and diversified evaluation mechanisms enable students to develop a more systematic competency structure in conceptualization, technical tool application, and design logic expression, avoiding the drawbacks of traditional classrooms that rely too heavily on single evaluations and paper-based results. Through comprehensive practice and feedback, students' immersive learning experiences within a real-world project environment strengthen their understanding of the integrity of design tasks and foster stronger collaboration and communication skills, ultimately creating a mutually aligned understanding between the classroom and industry expectations. At the same time, the involvement of corporate mentors in the teaching process not only provides students with more practical guidance but also helps teachers broaden their perspectives in course design, achieving a balance between academic and applied learning. However, this study still has certain shortcomings, such as the limited number of project case sources, insufficient industry coverage, and a focus on specific aspects of course implementation. Further monitoring of teaching effectiveness in the longer-term career development phase is needed. Future research should continue to expand the scope of corporate types, case diversity, and interdisciplinary integration to establish a more comprehensive and sustainable model of collaborative education between universities and enterprises.

Acknowledgements

This work was supported by Xi'an Peihua College 2024 second batch of school-enterprise cooperation curriculum construction projects.

References

[1] Liu Runfang. Research on innovative teaching methods of ceramics in secondary vocational architectural design courses [J]. Ceramic Science and Art, 2025, 59(1): 46-47

[2] Cao Maoqing, Zhang Yunying, Song Xue, Li Riqiang, Liu Weiqi. Innovation and practice of teaching in higher vocational architectural design courses based on the "four-wheel drive" mechanism under the background of industry-education integration [J]. Vocational Technology, 2024, 23(4): 94-102

[3] Long Hao, Tian Qi, Meng Yang. Incisive and innovative housing - "Residential Building Design" of Chongqing University's architecture major Breakthrough and innovation in curriculum teaching reform [J]. Architectural Skills (Chinese and English), 2024, 30(7): 58-62

[4] Yue Hua. Practical innovation of digital teaching form - taking the introductory course of architectural design as an example [J]. Central China Architecture, 2024, 42(1): 163-166

[5] Cao Maoqing, Wen Lin, Li Yubao. Innovation and practice of architectural design curriculum system in higher vocational colleges under the background of BIM drive, "trinity" and collaborative education [J]. Vocational Technology, 2022, 21(5): 96-101

[6] Qureshi H. Collaborative architectural design studio environment: An experiment in the studio of Architectural Design-I[J]. Archnet-IJAR: International Journal of Architectural Research, 2020, 14(2): 303-324.

[7] Saghafi M R. Teaching strategies for linking knowledge acquisition and application in the architectural design studio[J]. Archnet-IJAR: International Journal of Architectural Research, 2021, 15(2): 401-415.

[8] Auernhammer J, Roth B. The origin and evolution of Stanford University's design thinking: From product design to design thinking in innovation management[J]. Journal of Product innovation management, 2021, 38(6): 623-644.

[9] Burton L O, Salama A M. Sustainable Development Goals and the future of architectural education–cultivating SDGs-centred architectural pedagogies[J]. Archnet-IJAR: International Journal of Architectural Research, 2023, 17(3): 421-442.

[10] De Borba G S, Alves I M, Campagnolo P D B. How learning spaces can collaborate with student engagement and enhance student-faculty interaction in higher education[J]. Innovative Higher Education, 2020, 45(1): 51-63.

[11] Zhou Y, Xu G. Vocational school–enterprise cooperation in China: A review of policy reforms, 1978–2022[J]. ECNU Review of Education, 2023, 6(3): 433-450.

[12] Bian F, Wang X. School enterprise cooperation mechanism based on improved decision tree algorithm[J]. Journal of Intelligent & Fuzzy Systems, 2021, 40(4): 5995-6005.

[13] Deng B, Rattanasiraprapha N. THE SCHOOL-ENTERPRISE COOPERATION IN HIGHER VOCATIONAL EDUCATION OF GUANGDONG PROVINCE[J]. Journal of MCU Philosophy Review, 2025, 8(1): 367-374.

[14] Wang Y. The Mode of School-Enterprise Cooperation to Solve the Talent Dilemma of Small and Micro Enterprises[J]. Adult and Higher Education, 2022, 4(14): 36-42.

[15] Qin Q, Lei Y. Research on existing problems and countermeasures in school-enterprise cooperation in private higher vocational colleges[J]. Journal of Education and Educational Research, 2024, 7(1): 222-226.