

# *Research on the Implementation Path of the Second Year Architectural Design Curriculum Reform in Applied Undergraduate Colleges Based on OBE Concept*

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**Abstract:** Currently, China's higher education reform is focusing on the important direction of "new engineering" construction, especially for local applied universities, which is the core goal of their development. The basic guarantee for achieving this goal is the OBE (Outcome-Based Education) educational philosophy. In this context, as a key theoretical course in the field of architecture, the Principles of Architectural Design has also begun to actively explore and practice the teaching mode of OBE. The content of architectural design courses has strong practicality and is the cornerstone of the formation of students' engineering design abilities and professional qualities. For students majoring in architecture, it has a dual significance of being an introduction to design and a theoretical foundation platform for the construction profession. Finally, the research results indicate that after the curriculum reform, the attendance rate of students in the classroom has significantly improved, with all students attending classes in 2023, accounting for 75% of the total class hours. Moreover, the participation rate in the competition has also significantly increased, from only 7% of students participating in the competition in 2022 to 23% in 2023.

## **1. Introduction**

With the rapid development of society and the continuous progress of technology, the demand for talents in the construction industry is increasingly showing a trend of diversification and compounding. In this context, as an important base for cultivating high-quality and practical architectural talents, the teaching reform of architectural design courses in applied undergraduate universities is particularly important. Traditional architectural design courses often focus on imparting theoretical knowledge, while neglecting the cultivation of students' practical abilities and the improvement of professional ethics, resulting in difficulties for students to quickly adapt to the needs of the industry after graduation. Therefore, based on the concept of Outcome-Based Education (OBE), reforming the second year architectural design curriculum in applied

undergraduate universities has important practical significance and far-reaching development prospects. The OBE concept emphasizes student-centered learning outcomes and guides various stages of the teaching process by setting clear learning objectives and evaluation criteria. This concept is highly compatible with the current demand for talents in the construction industry, and can provide strong theoretical support and practical guidance for the reform of architectural design courses in applied undergraduate universities.

The aim of this study is to conduct a comprehensive and systematic reform of the second year architectural design course in applied undergraduate universities based on the OBE concept. By deeply analyzing the problems and shortcomings of the current curriculum, combined with industry needs and student reality, specific reform paths and strategies are proposed to improve the teaching quality of the curriculum and students' practical abilities. At the same time, this study also constructs a scientific and reasonable evaluation system to comprehensively and objectively evaluate the effectiveness of reforms and provide a basis for continuous improvement. This study focuses on the following aspects: the first is to clarify the goals and positioning of curriculum reform, which is to build a student-centered curriculum system with improving teaching quality and student practical abilities as the core; the second is to analyze the problems and shortcomings of the current curriculum, and provide targeted suggestions for reform; then, based on the OBE concept, specific reform paths and strategies are proposed, including setting teaching objectives, optimizing teaching content, innovating teaching methods, and improving the teaching evaluation system; finally, by implementing reforms and conducting effectiveness evaluations, the experience and lessons learned from the reforms are summarized, providing reference and guidance for future teaching reforms. Through this study, it is hoped that useful ideas and methods can be provided for the reform of the second year architectural design course in applied undergraduate universities, promoting the significant improvement of the teaching quality of the course and the practical ability of students, and making contributions to cultivating more high-quality and practical architectural talents.

## 2. Related Works

In recent years, with the continuous deepening of education reform, the result oriented education concept has received widespread attention worldwide. The OBE concept emphasizes that student learning outcomes are the core of education, and guides various stages of the teaching process by setting clear learning goals and evaluation standards. In applied undergraduate universities, how to integrate the OBE concept into curriculum design, especially architectural design courses, to improve teaching quality and students' practical abilities has become a hot research topic in the current education field. Yang P et al. proposed methods such as segmenting teaching objectives, rearranging teaching content, modularizing teaching, and developing typical tasks to promote endogenous learning motivation and improve the effectiveness and flexibility of practical teaching [1]. Li J et al., guided by the OBE concept, explored and practiced the teaching reform of computer graduate courses from the perspective of new engineering construction, covering aspects such as setting teaching objectives, designing teaching content, reforming teaching modes, and establishing teaching evaluation mechanisms [2]. At the same time, Yang B et al. proposed reform and innovation in teaching mode, practical learning, and course evaluation to address the issue of unsatisfactory teaching effectiveness in the course of architectural structural design. The aim is to improve students' learning initiative and effectiveness, and promote their mastery and application of knowledge in practice [3]. Cheng H et al. focused on innovation in electrical engineering education, emphasizing the construction of a student-centered curriculum system, as well as the importance of innovative teaching methods and evaluation systems [4]. Moreover, Cao H et al. adopted the

teaching philosophy of OBE and carried out comprehensive reforms in curriculum organization, content, teaching methods, and evaluation, achieving a close integration of curriculum objectives and student needs [5]. Yang S et al.'s research focused on educational curriculum reform and empirical research based on OBE philosophy, revealing the important roles of curriculum design, teacher training, resource utilization, and student participation in the reform process [6]. Xifeng W et al. focused on the construction of civil engineering courses, starting from the concept of OBE, proposed a course construction path of collaborative planning and design, and conducted active practical exploration [7]. Liu R's research focused on practical teaching in the field of electronic information and proposes reform measures based on the OBE competency oriented education concept [8]. Simarmata H A et al. conducted research on curriculum reform and curriculum freedom through literature review and descriptive analysis techniques, and proposed a more flexible curriculum framework [9]. Yang F et al. explored the autonomous learning model based on the OBE concept in university teaching based on Internet of Things technology, providing new ideas for students' autonomous learning [10].

Although the above research has actively explored and practiced teaching reform under the OBE concept, there are still some shortcomings. Firstly, there is relatively little research on the reform of the second year architectural design course in applied undergraduate universities, and there is a lack of targeted teaching reform paths and strategies. Secondly, existing research often focuses on a certain aspect of reform during the implementation process, lacking systematic and comprehensive consideration. Finally, the evaluation of the effectiveness of reforms often relies on a single evaluation method and lacks a diversified evaluation system. Therefore, in response to the above issues, starting from the OBE concept, a comprehensive and systematic reform research was carried out on the second year architectural design course in applied undergraduate universities. The study proposed specific reform paths and strategies, including setting teaching objectives, optimizing teaching content, innovating teaching methods, and improving the teaching evaluation system. Finally, this article established a diversified evaluation system to comprehensively and objectively evaluate the effectiveness of reforms and provide a basis for continuous improvement. Therefore, the title of this article has clear research objectives, a systematic reform path, and a comprehensive evaluation system, which can provide useful reference and guidance for the reform of the second year architectural design course in applied undergraduate universities.

### 3. Methods

#### 3.1 OBE Philosophy

OBE, also known as outcome oriented education, has received rapid attention and widespread application worldwide. After years of development, OBE has formed a complete theoretical system and is considered the correct direction to promote the pursuit of excellence in education. OBE has become the mainstream concept of education reform in countries such as the United States, the United Kingdom, and Canada. Especially in the field of architectural education, the American Association for Accreditation of Architects has fully adopted the OBE concept and made it the core of architectural accreditation standards [11].

The OBE concept originates from one of the three principles emphasized by the American Engineering Education Accreditation Association, which is "result-oriented, student-centered, and continuous improvement". Since China joined the Washington Accord and officially became a member, as well as the concept of "new engineering", these three principles have gradually become important directions for the reform of engineering education in Chinese universities. Among them, the OBE concept has received much attention due to its leading role. The OBE concept can be summarized as two "W" and two "H", namely: What and Why, as well as how to achieve these

results (How) and how to evaluate whether students have achieved these results (How to Know). This conceptual model not only focuses on traditional theoretical systems and practical skills, but also emphasizes the balance of knowledge, ability, and quality, and emphasizes the impact of educational implementation on the long-term development of students. For example, it requires students to be able to cope with practical work challenges five years after graduation and continuously improve their professional skills in a wide social context. This requirement is a huge challenge for the education system. Firstly, it requires educators to examine education from a more macro perspective, expanding their focus from a single course or major to the entire disciplinary field. Secondly, it emphasizes integration and long-term development, breaking down the boundaries between different courses, majors, and disciplines, and enabling students to acquire sustainable knowledge and abilities. Finally, it has transformed the center of education from a traditional teacher centered approach to a student-centered approach, which undoubtedly poses a significant challenge to traditional educational models and concepts [12-13].

### 3.2 Teaching Reform Path

Teaching paths are designed around the goals of each chapter. After refining and categorizing the goals of each chapter, teachers draw a goal acquisition path map to guide the writing of teaching calendars and lesson plans. Teachers divide learning objectives into three types: knowledge objectives, ability objectives, and quality objectives. For different types of goals, teachers set different learning paths, and knowledge goals are mainly achieved by professors. At the same time, chapter tests are used to facilitate students' understanding and memory of knowledge; the ability goal adopts the constructivist theory before explaining and asking questions. Therefore, teachers can assign homework before teaching the course, and students can answer questions through independent exploration and thinking. A teaching model of assigning homework, completing homework, and teaching can be adopted, combined with more subjective homework to facilitate the acquisition of knowledge in practice; the quality goal is based on the training of the first two, supplemented by extracurricular videos, in order to broaden students' knowledge, understand more architectural culture, and establish correct architectural views and patriotism. On the one hand, students can fully utilize the high-quality resources of the internet; on the other hand, students can choose different resources to learn based on their interests. Teachers should tailor their teaching to individual needs and achieve personalized teaching. After clarifying the corresponding relationship between chapter objectives and the three learning objectives, teachers can use corresponding teaching methods and practice after class to achieve the established chapter objectives.

Combining student subject competitions with architectural design courses is an important way to achieve results oriented teaching. Unlike traditional coursework assignments, it integrates team collaboration throughout the design process and tests students' overall quality. In recent years, architectural design competitions have often focused on current hot issues related to people's livelihoods or the future planning and development of cities [14]. For students, competition practice can expand their knowledge, understand cutting-edge directions, and cultivate practical skills in problem-solving and problem-solving. Students can choose their own areas of interest and advantage to achieve differentiated teaching, enabling them to learn and master more software and technology, and enhance their initiative. At the same time, the competition mode is in line with the results oriented concept, and students have a clear goal - to win awards in the competition, with positive incentives to shift learning from passive to active. Short term effective feedback after the competition should be provided - obtaining rankings or gaining experience from the works and introductions of the winners [15]. The requirement of diversity and flexibility can effectively improve the current teaching situation.

Moreover, teachers should provide guidance, encouragement, and support to students, plan a learning framework for them, and enable them to explore and learn independently within the established scope. The first is the pre class preparation stage. Before the start of the course, the teacher can distribute the learning task list to the students. After learning the final learning results, the students can freely form groups of 4-6 people before class, and each group member can discuss their own division of labor. The teacher distributes the course resource package to the students, and the students explore learning in groups based on the learning task list, forming a preliminary understanding and understanding of the knowledge in this lesson, and providing feedback to the teacher on the problems encountered during learning. The second is in class: implementation stage. At the beginning of the class, the teacher first answers the questions collected from the students before class, and then explains the requirements and precautions for creating the work. When students engage in collaborative practice, teachers should constantly inspect and observe, and make good classroom observation records. They should provide guidance to groups that are difficult to advance and inspire students. Teachers should encourage students to try different ways of expression and focus on cultivating their innovative awareness and practical abilities. The third is the end of class: presentation stage. In the last 15 minutes of the course, each group can elect a representative to report on stage. The report content includes the design ideas, core concepts, team division, and production process of the work, mainly testing students' understanding and application of the knowledge in this section, as well as the collaborative ability of group members. After each group completes their report, other groups can give evaluations, and the teacher can summarize and provide feedback.

### 3.3 Evaluation Methods

The process evaluation calculation method for the reformed curriculum is: work score=student self-evaluation (30%)+group peer evaluation (30%)+teacher rating (40%). In addition, each semester's design courses are evaluated in a summary manner, with a total score including process score and work score. Process score refers to the performance in the classroom, while work score refers to the average score of all works in the current semester. The calculation method is: total score=process score (50%)+work score (50%). Table 1 shows the evaluation and assessment methods after the teaching reform.

Table 1: Evaluation and assessment methods

Assessment method	Evaluation level	Evaluation criterion	Weight (%)
Score of works	Student self-evaluation	Student self-scoring	30%
	Group mutual evaluation	Scoring by team leader	30%
	Teacher rating	Marking based on homework completion	40%
Process evaluation	Class discipline	Late arrivals, early departures and absenteeism	30%
	Learning task	Completion of assignments	40%
	Motivation	Responding to interactions in class	30%
Semester total score	Score of works		50%
	Process evaluation		50%

## 4. Results and Discussion

### 4.1 Effectiveness of Teaching Reform

The study selected 237 students from the 2022 level who studied architectural design in the 2023 design experimental project test and compared their grades before and after the curriculum reform. The study began teaching reform in 2023, and at the time of the reform, students in the 2022 cohort were in their second year of university courses. The teaching plan includes 28 class hours of classroom practice (including 4 theoretical courses and 24 experimental courses), 4 class hours of self-directed learning, and 4 submission of practical reports. The completion form of autonomous learning for four hours is to complete all task nodes in the online APP. Figure 1 shows the completion of class hours for these 237 students.

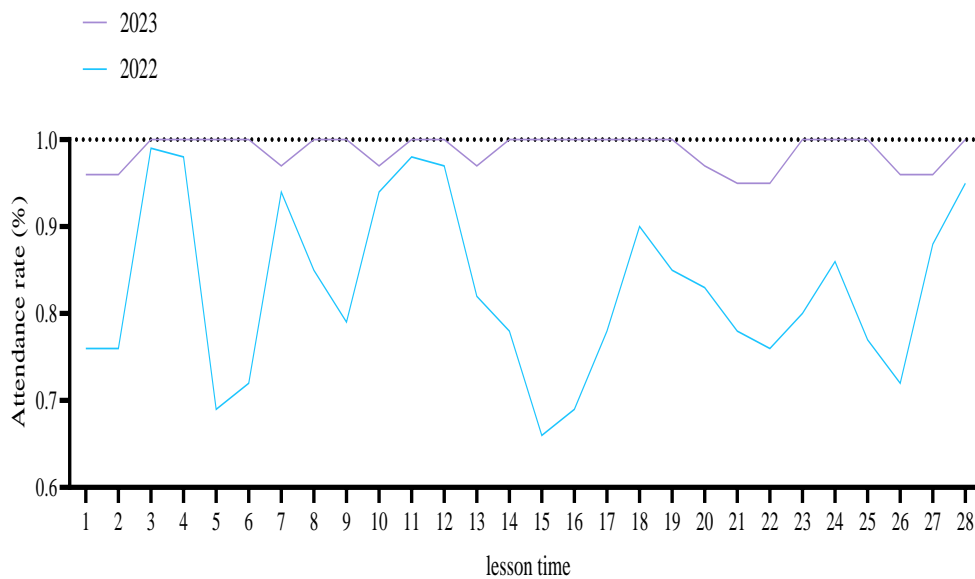


Figure 1: The attendance rate of all class hours

In the comparative data in Figure 1, it can be clearly observed that since the application of the new teaching reform plan in 2023, the attendance rate of students has significantly increased. Especially noteworthy is the occurrence of all students attending classes for learning, which has accumulated to 18 class hours, accounting for 75% of the total class hours. In contrast, data from 2022 shows that there has not been a situation where all students attend classes, highlighting the positive impact of teaching reform on student participation.

The study aims to comprehensively implement the reformed teaching plan for students in the 2022 cohort, and to conduct a comparative evaluation based on the initial design materials for the 2021 and 2022 cohort in their second year of university. The design topic for second year college students in 2021 is the design of a multifunctional cultural center. The design topic for second year college students in 2022 is Future Urban Residential Design. The design calculation manual compares and evaluates the qualification rates of three evaluation indicators, including writing format, outdoor calculation parameter expression, and interior design parameter expression. The results are shown in Figure 2.



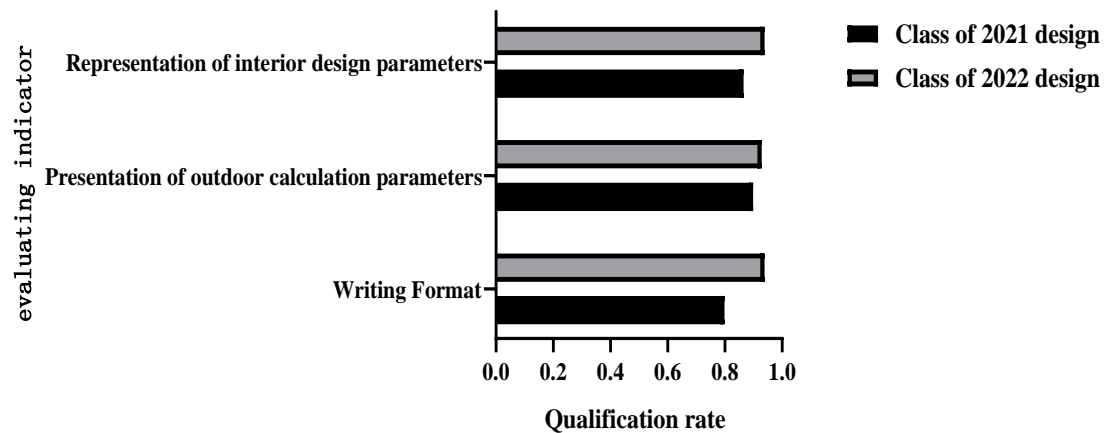


Figure 2: Completion status of the initial draft of design materials

From Figure 2, it can be seen that the qualification rates of the writing format of the design calculation manual, the expression of outdoor calculation parameters, and the expression of interior design parameters were higher in 2022 than in 2021. This indicates that the reflection on typical problems and improvement measures for teaching strategies in designing calculation manuals have achieved significant results.

#### 4.2 Competition Situation after Reform

Afterwards, the study compared the participation of students in competitions in 2022 and 2023, based on three evaluation indicators: participation level, competition type, and competition performance. The results are shown in Table 2.

Table 2: Student participation in competitions

Evaluation indicators	Specific details	2022	2023
Competition participation	Number of students in the session	7%	23%
Type of competition	Green building design competition	2	5
	Historic district renovation design competition	1	4
	Invitation to competition	2	2
Competition score	National awards	1	3
	Provincial awards	1	4
	Municipal awards	2	4

From the data provided in Table 2, it was clear that in 2023, compared to 2022, there was a significant increase in student participation and awards in architectural design competitions. In terms of the number of students participating in the competition, only 7% of them participated in the competition in 2022, but by 2023, this proportion surged to 23%. This indicates that more and more students are beginning to realize the importance of participating in competitions. They are willing to use competitions to test their learning outcomes, improve their professional skills, and take this opportunity to showcase their talents. Secondly, in terms of competition types, the number of participants in green building design competitions and historical block renovation design competitions has increased. This reflects that students are increasingly concerned about sustainable

development and historical and cultural preservation, and they are willing to combine their knowledge with practical problems to provide innovative solutions to solve real-world problems. At the same time, the number of students invited to participate in the competition has remained stable, indicating that the school and relevant institutions have also made positive efforts in inviting outstanding students to participate.

Finally, from the perspective of awards, the number of students winning awards in various levels of competitions has increased in 2023. The number of students who have won national level awards has increased from 1 to 3, and the number of winners of provincial and municipal awards has also increased. This fully demonstrates that the competition level of students is constantly improving. At the same time, this also lays a solid foundation for the future career development of students, enhancing their confidence and competitiveness.

## 5. Conclusions

This study explored and practiced the teaching mode of the core theoretical course "Principles of Architectural Design" in the architecture major of local applied universities based on the OBE concept. After a series of reform measures, this study achieved significant results. By applying the OBE teaching philosophy, the teaching objectives of the course and the learning outcomes of students were clarified, making the teaching process more focused on the actual needs and ability development of students. This result oriented teaching model effectively enhanced students' learning enthusiasm and autonomy, thereby significantly improving their classroom attendance rate. Secondly, by optimizing teaching content and methods, the practicality and applicability of the course were strengthened. This not only enables students to better understand and master the basic principles and methods of public building design, but also enhances their engineering design abilities and professional qualities. At the same time, encouraging students to participate in various design competitions further stimulates their innovative spirit and competitive awareness, resulting in a significant increase in their participation in competitions. This not only improves the teaching quality of the course and the learning effectiveness of students, but also lays a solid foundation for their future career development. Therefore, it is recommended to further deepen and promote the OBE teaching model in future teaching, in order to further improve students' professional literacy and practical abilities.

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