

# A Study on the Application of the “Residential Interior Design” Course Based on Flipped Classroom

## With the Joint Efforts of Schools and Enterprises

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### ABSTRACT

This paper systematically scrutinizes difficulties confronted with reforming the course, "Residential Interior Design", in the integration between industry and education, after which the flipped classroom approach is introduced. Leveraging "cloud classroom" platforms and 3D visualization technology for decoration design, this paper built a teaching model with the joint efforts of schools and enterprises based on the flipped classroom, in ways to comprehensively interlink the online and offline teaching process, that is, "enterprises proposing a task before class — teachers approaching the task in class — addressing the task with the joint efforts of schools and enterprises after class". That's how teaching activities can better be geared for the entrepreneurial process, so as to step up teaching reform and obtain optimized results.

**Keywords:** *Flipped Classroom, Joint efforts of schools and enterprises, Teaching reform, learning algorithm, Residential interior design*

### 1. INTRODUCTION

Recent years have seen a series of related policies promulgated at the state level, indicating the integration between education and industry is the essential component for the reform of higher vocational education; There is also a growing trend for applying various information-based teaching mode, among which flip classroom approach, with its flexibility and convenient availability free of time and space restriction [1], has become a crucial part of teaching reform in the reform of higher vocational education. To stay in tune with the reform trend, it is necessary to phase in the flipped classroom, and employing "cloud classroom" and teaching means empowered by decoration-related modern information technology teaching means such as 3D visualization technology to restructure the teaching process of the "residential interior design". In this way, students' vocational experience will be underpinned and the integration between education and industry will be enhanced in the teaching mode with the joint efforts of schools and enterprises, with a view to attaining better teaching results.

### 2. BACKGROUND THE NECESSITY OF REFORMING THE “RESIDENTIAL INTERIOR DESIGN” COURSE WITH THE JOINT EFFORTS OF SCHOOLS AND ENTERPRISES

#### 2.1. The evolution of the "residential interior design" course teaching pattern

The “Residential Interior Design” course, as the quiescence of the subject, architectural decoration engineering technology, is highly practical with broad application range and concerned with the real situation. Today, many majors in higher vocational education offer such a course, including architectural decoration engineering technology, interior design. The main content of the course incorporates the multi-functional space design of the residence, interior design of small and medium-sized houses, interior design of large single-storey house or villa. The teaching model of the course has evolved from the traditional "comment + revise" pattern to the later project-based teaching; Nowadays, as specialty companies sprung up, the teaching model with the joint efforts of schools and enterprises to undertake residential decoration projects

in real life emerges under such circumstances; The evolving process of each pattern is shown in Table 1.

**Table1: The evolution of Teaching Mode**

Teaching Mode	Teaching Process	Teaching Activities
Traditional Teaching	Teaching theories	Teachers expound theoretical knowledge and assign tasks to students;
	Project design practice	Teachers comment on students' homework during classes, Students complete and revisetheir work;
Project-based Teaching	Project 1: analysis of residential design elements	Teachers instruct residential elements regarding various functions;
	Project 2: planning for interior residential design	Teachers assign tasks regarding the interior residential design; Students conduct the initial design; Students present their design ideas;
	Project 3: optimizing the interior residential design layout	Teacher comment on each students' work; Students adjust according to the teacher's comments;
	Project 4: Plotting construction drawings and further modification	Students make construction and effect drawings under the guidance of teachers
Teaching mode with the joint efforts of schools and enterprises	Enterprise proposing tasks	Before class, a specialty company undertakes a project, for which teachers accommodate the task with teaching objectives; Student research the task in teams. By communicating with the owner, they will be acquainted with what they require.
	Approaching the task in class	In class, 3D visualization technology is applied to display preliminarily optimized schemes; Teachers invite industry mentors, the owner, group classmate in the same team to comment on students' work;  In response to the

		comments,  teachers show how to better write the plan and students modify the plan.
	Addressing the task with the joint efforts of schools and enterprises after class	After class, when students complete the project design, they will further communicate with the owner;  Students make construction drawing, effect drawing, 3D/VR visualization drawing;  The scheme approved by the owner will be put into construction by a specialty company.

**2.2. Shortcomings lying in the "Residential interior design" course and the necessity of the reform**

From the abovementioned teaching mode, it can be inferred that there are shortcomings lying in the "residential interior design" course:

First, student engagement is limited to little initiative, resulting in difficulties to stimulate interest. As can be seen from Table 1, both in the traditional teaching mode and the project-based teaching model, teachers are typically the central focus of a lesson with students being the passive receiver. Albeit with the characteristics of applicability and simplicity, the theory of residential interior design knowledge can hardly maintain students' interests at the beginning stage. This leads to a predicament, that is, when students are asked to plot a design later, they are prone to rely on their own experience and imagination by referring to what their home looks like, instead of considering the task's background or based on theoretical knowledge. Eventually, teachers would have to spend a lot of time in teaching repeated theories when commenting. The learning efficiency is degraded.

Second, with teaching "in parallel with" practicing when fulfilling projects, theory teaching in class is often divorced from the actual work. After introducing project-based teaching, project 1 divided the theoretical knowledge that used to "cram" into students according to the functional space of the housing, which is conducive to enhancing students' memory and understanding. Projects 2, 3 and 4 can achieve "integration of learning and practicing" to a certain extent, with the center gradually shifting from teachers to students. However, in project 2, the plan of "Residential interior design" is usually proposed by teachers, who usually offer unrealistic teaching content

incompatible to designers' workflow. This would lead to the separation between teaching and practicing, leaving the integration between education and industry a mere slogan.

Third, without pre-class warm-up and after-class expansion, students' initiative in learning is hard to cultivate. These two modes, the traditional and project-based one, fails to effectively activate students either before class or after class, in which autonomous learning is missing. To bridge the missing part, teachers have to speed a lot of time in class to help students reviewing theories and what has learned. As such, students are in a passive state with low learning efficiency and demoted learning quality.

Fourth, the teaching content fails to cater to students' individual needs or aptitude. The teaching content, key and difficult points are all designed according to the general problems faced by most students, while students are proponents with distinctive personalities, teachers should render personalized and customized guidance, which is an integral part of teaching. How to achieve the most efficiency, best quality, pragmatic guidance are questions that need to be untangled in current teaching reform.

To handle the above problems and enhance the integration between industry and education, the paper puts forward building the "residential interior design course based on flipped classroom with the joint efforts of schools and enterprises". A flipped classroom is a new instructional strategy and a type of blended learning focused on student engagement and active learning, which transfers the initiative of learning from the classroom to students by adjusting the time inside and outside the classroom [2]. The joint efforts of schools and enterprises is a new cooperation model that overturns the traditional "school-centered" or "enterprise-centered" pattern, thus forming a mixed platform with the integration between education and industry, where enterprise project is equivalent to teaching project, project cycle is teaching process, and enterprise achievement is teaching outcome. Its main process is "enterprises proposing a task before class — teachers approaching the task in class — addressing the task with the joint efforts of schools and enterprises after class", which blends online teaching, classroom teaching and enterprise practice together. Under such settings, students can flexibly arrange their learning time, with the learning process simulating the designer's working process, where enterprises also take parts. During learning, students are gradually equipped with comprehensive abilities, including negotiation in architectural decoration engineering projects, scheme conception, design optimization, site management and even the leadership in presiding over a project independently.

### **3. THE APPLICATION OF THE “RESIDENTIAL INTERIOR DESIGN” COURSE BASED ON FLIPPED CLASSROOM WITH THE JOINT EFFORTS OF SCHOOLS AND ENTERPRISES**

#### ***3.1. Fortifying curriculum resources***

Steps to fortify curriculum resources principally are described as follows. The first step is building a platform with the integration between education and industry. Since teaching the subject of architectural decoration engineering technology has evolved from promoting its scales to elevating its qualities. To ensure the sustainable development of the platform with strengthened integration between education and industry, the major has joined hands with local benchmark architectural decoration enterprises and set up its own specialty company. That's how it blazes a trail in the teaching concept, meanwhile fusing innovativeness, design practice and entrepreneurship into teaching<sup>[3]</sup>.

The second step is drawing up basic teaching documents, primarily including the syllabus, course standards, teaching program, teaching plans, teaching courseware, etc.; In addition, we also created the *Consultant Handbook for the Decoration Major*, in which it illustrates how decoration companies are like, including its organizational structure, department configuration and job responsibilities, the requirement for quality and ability, cooperative enterprise introduction, through which students will better understand different professional ability and quality they need to master to apply for various positions and plan for their own career path.

The third step is to pool all kinds of resources. In tune with the characteristics of the course "Residential Interior Design", the teacher team worked out the house type library, decoration style library, decoration materials library, construction technology library; In engineering practice, they recorded copious decoration mini-lessons, so as to expand students' extra-curriculum knowledge. Moreover, the "Residential Interior Design" course also entails students to be adept in design and drawing, to possess aesthetic appreciation, communication capability and empathy for other people's situations. This is what sets the course apart, as other architectural courses underline skills.

#### ***3.2. Organizational design of the curriculum***

With flipped classroom fusing online platform and online resources, and the joint efforts of schools and enterprises incorporating corporate roles into the whole

teaching process, the specific organizational design of the curriculum is shown as follows: before class, enterprises issue real-world housing design projects, while teachers transform it according to the teaching requirement, after which teachers assign pre-class tasks through cloud classroom platform: students conduct an on-the-spot investigation and measure the dimensions of the targeted house; After communicating with the owner, students design the preliminary scheme with 3D visualization technology. In class, students, as the center of teaching, present their preliminary plan, while teachers, classmates, industry mentors and the owner comment on the plan; Teachers are responsible for summarizing these comments. For those problems most students would face, teachers guide them in an all-rounded way, and then students modify them in class. This would save time for teachers, who can carry out personalized tutoring. After class, students bring the revised plan to the enterprise for practice, and continue to communicate with the owner, hence prompting the implementation of the plan; The scheme approved by the owner shall be sent to enterprises for further improvement and construction. Flipped classroom reinforces students' self-learning before and after class. In addition, with enterprises' participation in the whole teaching process, the gap between the teaching content and the engineering reality narrows, thus moving beyond the limitations faced by traditional teaching.

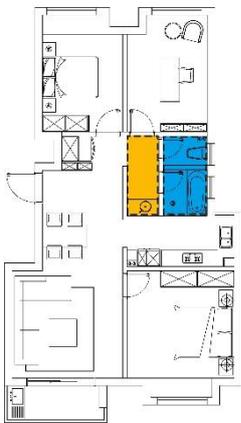
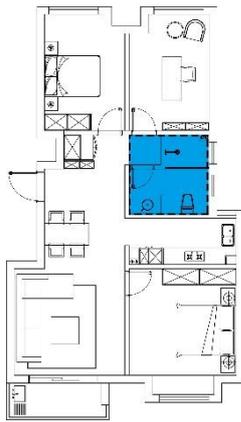
### **3.3. Teaching implementation process**

The course of Residential Interior Design employs the conventional project-based and task-driven form, while assimilates the joint efforts of schools and enterprises based on the flipped classroom, with an attempt to establishing a teaching organizational form that breaks through the time and spatial restrictions. The followings are a specific explanation of how to implement such teaching taking the typical task, "optimizing the layout design of small and medium-sized residence", as an example. The teaching objectives of this task are: through learning, students can effectively communicate with design objects, reasonably optimize the residential layout, flexibly apply design elements, and leverage design software to assist their drawings.

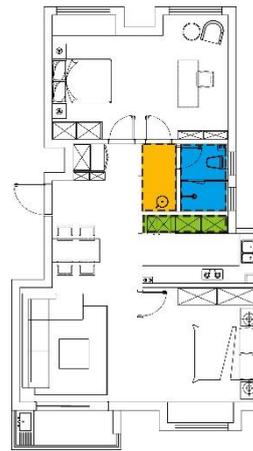
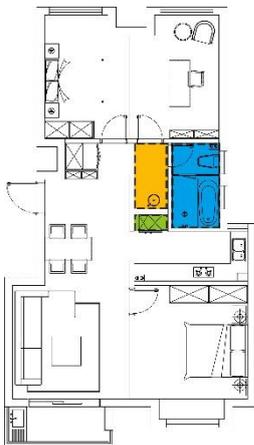
Before class, related resources, tasks, and implementation rules will be issued online. At this stage, teachers check the pre-task, release new tasks, extract the key and difficult points, and upload the materials to facilitate students' self-learning on the cloud classroom platform. Teachers are also required to clarify how to complete the tasks and set a deadline for the pre-class tasks. For instance, based on the humanistic nature of "optimizing the layout design of small and medium-sized residence", the teacher should release the task of "on-the-spot investigation" one week before class. The task asks students explain the

preliminary design scheme to the owner, by which students would know the gap between their schemes and the owner's expectation; Students are required to record videos of what the owners demand, improve their design scheme before class, and prepare for the presentation of their schemes. It is worth noting that as the "Residential Interior Design" course is scheduled to be offered in the first semester of students' sophomore year when most of them can plot drawings, so students are expected to draw and submit their drawings before class. Teachers can navigate students through common problems by reviewing and commenting, such as how to draw more standardly, while in class, teachers should spend the most time conducting individualized guidance. Materials provided to support self-learning include video instructing how to negotiate with owners and how to optimize residential layouts, etc.

In class, students, acting as the active proponent, shall showcase their schemes, listen to what all sides comment, and design practices to improve their deficiencies. Through analyzing the demands of owners via the recorded videos, students are expected to compare their preliminary plan with the optimized plan based on 3D visualization technology, during which they should mainly talk about what kind of convenience the optimized plan brings to the owner's life. For example, for a family with five people composed of three generations, one of its requirements is to separate the use of toilets for public and private intention respectively during peak hours. To address the appeal, students have designed the layout optimization plan (as shown in Figure1). After the link, teachers, industry mentors, the owner and classmates will evaluate the student's optimization plan [4]. Before class, the teacher will send the QR code of students' optimization plan to owners and industry mentors and collect the evaluation results from both sides. The opinions of owners are usually directly expressed as "it is applicable or not, like it or not, etc.;" For industry mentors, they will propose an advanced plan to further improve the student's scheme, that is, on the basis of separating toilets for public and private use, the length of the corridor should be shortened and the kitchen should be expanded to make room for the refrigerator and cabinet (as shown in Figure2); After that, teachers in the school will provide comprehensive guidance to common problems and mentor students individually, while classmates' comments will help each other and contribute to friendly competitions.



**Figure1.** Preliminary plan and optimization plan



**Figure2.** Advanced optimization plan

After class, to consolidate what has been learned online, students will communicate with the owner and practice in enterprises. At this stage, teachers are mainly responsible for instructing students on what to do after class: arrange students to communicate with owners and determine what the deadline of the plan is; Contact industry mentors to introduce students to intern and practice their skills in the company. It is noteworthy that as the scheme approved by the owner will be constructed by the partner enterprise or the specialty company, students can participate in the construction process and management so that they can engage themselves in the decoration industry in advance and exercise their ability of design and grasp knowledge about construction management. Based on the flipped classroom, with the process of "enterprises proposing a task before class — teachers approaching the task in class — addressing the task with the joint efforts of schools and enterprises after class", the course is in line with the actual decoration process. It reshapes students' design thinking and redefines students' professionalism, so as to contribute brand-new craftsman with ingenuity and practicableness to the era.

#### **4. HIGHLIGHTS OF IMPLEMENTING THE TEACHING MODE BASED ON FLIPPED CLASSROOM WITH THE JOINT EFFORTS OF SCHOOLS AND ENTERPRISES**

##### ***4.1. Set up a sustainable platform for the integration between production and education***

Different from general education, vocational education is oriented to boosting employment and industrial prosperity, and its pedagogical activities are tightly bound to external economic and social context [5].

From practical experience, architectural decoration engineering technology has progressed from the "apprenticeship program" to the "double mentor system" under the reform of integrating industry and education, as the reform strategy changed consistently with the continuous advancement of the industry. In addition to cooperating with local benchmark decoration enterprises, we shall also strive to establish a professional company independently, hire experts as our general manager, in charge of the company, and meanwhile, employ backbone teachers or industry mentors as project managers, responsible for projects' specific operations. Based on the project, it is necessary to establish the corresponding project team, select students who perform well to assume the position including project assistant, design, construction. In this sense, we can initiate a solid and sustainable community with the integration between education and industry that embarks on serving the society.

#### ***4.2. The practice of teaching should be guided by "3T"***

To better reform our current teaching mode, we should uphold the "3T" principle, that is, focusing on teachers, textbooks, teaching approaches. First, we shall reiterate the role of teachers. In the flipped classroom, teachers should act as a baton and controller, as a foil for highlighting the dominant role of students. They should also rationally arrange a limited time in class. Meanwhile, the introduction of industry mentors can test and renew the practical ability of teachers in schools. Secondly, in selecting textbooks, new forms of teaching materials should be utilized. For instance, we shall take full advantages of the life cycle of interior space mapping, scheme optimization, design integration, construction practice and delivery, so as to break the barriers exist in courses. We shall also use "set" and "loose leaf" teaching materials to fit course contents. Finally, in terms of teaching methods, it is critical to accommodate the actual project according to the teaching requirement. We shall also set our work process by referring to that of designers, integrating vocational training, craftsman spirit and entrepreneurial practice into daily teaching, which has a silent effect of smoothing things and changing students' learning habits inconspicuously.

#### ***4.3. Setting teaching goals and evaluation standards***

The traditional teaching objective is usually based on the curriculum, and regard fulfilling the course goal as equivalent to attaining the teaching goal. However, as vocational education is of paramount significance in serving local society and enterprises, macro and micro objectives of teaching should be set simultaneously in

teaching. Taking the Residential Interior Design course as an example, the macro goal is to reinforce social services, and its teaching practice should be compatible with the development of the industry and the local region, whereas the micro goal is for students to be proficient with the process and related skills of residential interior design, able to independently design residential schemes and construction drawing, and grasp how to manage residential decoration and construction.

The traditional teaching evaluation is often subjective and one-sided. Teachers often evaluate students based on their usual performance and whether they complete homework in time while ignoring how much they invest in design and actual level of students in the design process. In addition, teachers' views are often divergent from those of enterprises and owners. As such, to set more rational evaluation system, we should collect evaluation data on online platforms, employ mainstream social software to enhance process management, and take into account the opinions of industry mentors and owners, with a view to setting a fairer evaluation system based on evidence and backed by multiple perspectives.

## **5. CONCLUSION**

Vocational education and general education are equally crucial to our nation. It is our mission to customize our teaching methods to students' individual needs, so as to cultivate interdisciplinary quick-learners with a solid professional foundation and high vocational quality in the decoration engineering technology major. We shall keep on discovering the best path to accurately position our teaching objectives, optimize education strategies, and realize the true value of vocational education.

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