An Exploration of New Practical Teaching Model of “Apprenticeship System” in Architectural Design

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Keywords: Architectural design major, Practical teaching, Apprenticeship system, New model.

Abstract. The teaching of Architectural Design has a strong practicality. As a traditional education model, the “apprenticeship system” plays an important role in promoting the teaching of Architectural Design. Based on the specific practice of the new practical teaching model of “apprenticeship system” in Architectural Design, this paper divided the practical teaching model of “apprenticeship system” into three key links: special basic ability training, comprehensive practical skill training, and on-the-post skill training; took customizing targeted practical teaching scheme, enriching practical teaching models to inspire innovative thinking, improving the system’s evaluation criteria, and combining “inviting outside masters in” with “sending students out” as the important safeguard measures for the implementation of the new practical teaching model of “apprenticeship system”; and pointed out that the new practical teaching model of “apprenticeship system” can not only promote the students’ tacit knowledge acquisition and comprehensive ability including skill level, manipulative ability, and practical experience, but also enhance the students’ competitiveness and the employers’ satisfaction.

Introduction

The architecture industry has strong practicality. The architecture related majors of ordinary colleges and universities undertake the responsibility of cultivating high-quality talents for the architecture industry. However, judging from the teaching of architecture related majors in colleges and universities, it is prominent that the school teaching and practice are disconnected and the students’ practical ability is poor. As a professional talent cultivation model, the “apprenticeship system” has been widely used in higher vocational colleges, and it has achieved good results. In recent teaching practice, the new “apprenticeship system” has been actively applied to the teaching of undergraduate major of Architectural Design and has achieved good results. The relevant circumstances have been summarized as follows.

Key Links in the New Practical Teaching Model of “Apprenticeship System”

The new practical teaching model of “apprenticeship system” is to arrange practice “masters” for students during their study in school in order to enable them to fulfill the tasks of course design, simulation design project, and design competition under the guidance of the “masters”, thus achieving the combination of theory and practice ultimately through training. The key links in the new practical teaching model of “apprenticeship system” include special basic ability training, comprehensive practical skill training, and on-the-post skill training.

Special Basic Ability Training

The special basic ability training is a practical teaching model to enhance the practical ability of students that mainly carried out in the training base in schools, such as professional course classroom, CAD drawing classroom, etc. after the students complete corresponding basic professional courses such as Architectural Drawing, Building Architecture, CAD Drawing, etc. At this stage, after taking professional basic courses, the students generally acquire basic theoretical
knowledge, but lack operation ability and independent design ability. Therefore, in the teaching process of this link, it is feasible to widen the students’ horizons of architecture and promote their cognition and thinking of architecture through freshman seminar, case analysis, introduction to major, etc.; to improve the students’ aesthetic abilities and modeling expression abilities through practical trainings such as architectural sketching, visual performance, construction training, etc.; and to enhance the students’ professional skills through the architectural mapping, CAD drawing competition, etc. The special basic ability training can help students consolidate the study of professional theoretical knowledge, promote them to combine textbook knowledge with practical knowledge, cultivate their innovative consciousness, increase their proficiency of software operation, and enhance their operation abilities.

In the special basic ability training, the “masters” can be the school teachers as well as technical staff with strong professional skills from cooperative enterprises. Considering the teaching objectives of special skill training, the training content should be determined by the school in principle and the training should be based on the improvement of the students’ basic abilities and should not be too difficult. The school “masters” are the leading force for training, and the outside “masters” are the assisting force for training. The work of outside “masters” is mainly to introduce specific cases and work practices of construction to enable students to understand the architecture industry in advance. Meanwhile, the participation of outside “masters” in basic ability training in advance can lay a foundation for the students to create a network in the follow-up comprehensive practical skill training and on-the-post skill training and improve the communication efficiency of students, school “masters”, and outside “masters” in the future practical teaching. After the special skill training, students can have the basic practical operation ability of the architecture industry and are able to receive the comprehensive practical skill training.

Comprehensive Practical Skill Training

The special basic ability training generally starts from the second semester of the freshman year and ends at the second semester of the sophomore year. However, the special basic ability training during this period is constrained by the scattered setting time of related courses and students generally lack comprehensive application abilities. Therefore, it is necessary to provide students with comprehensive practical skill training after the second semester of the sophomore year. Such comprehensive practical skill training generally lasts one year to one and a half years. It may be carried out through simulation design training, design competition, specific architectural engineering, etc. based on the combination of subject frontier, social focus, new materials, and new technologies to provide guidance in “sending students out” and inspire their innovative abilities.

The comprehensive practical skill training adopts a combination of school training and outside practice. Firstly, the school training will be carried out with school teachers as “masters”. Relying on simulation design training and design competition, it helps students complete the comprehensive and systematic linking of various knowledge, helps students show their design ideas in various methods, and improves students’ independent design abilities and innovative abilities. Then, the outside practice will be carried out with cooperative enterprises’ technical staff as “masters”. The number of students of each “master” is controlled at about 5 to ensure that the “masters” can give each student careful guidance. Considering the actual situation of production of enterprises and the comprehensiveness of the practical teaching of this link, the practical training is based on specific architectural engineering and the teaching is conducted in a way that the “masters” explain, demonstrate, and answer and the students watch, operate, and question. In this link, the students are asked to complete the “regular homework”, such as weekly construction diary, learning experience, etc. according to teaching requirements.

The comprehensive practical skill training can enable the students to integrate basic abilities, use architectural design software to express design ideas, and have a more comprehensive and systematic understanding of basic architectural design and construction process. Meanwhile, in this link, the students are in the forefront of production of enterprises, so they can have an intuitive understanding of the ecology of the architecture industry, which helps them know the future
occupational situation in advance and lays a foundation for them to quickly adapt to the work after graduation.

**On-the-post Skill Training**

The on-the-post skill training is generally provided in the senior year or the fifth year. It is the last link in practical teaching. In the special basic ability training and comprehensive practical skill training, the students’ agency and initiative are limited because they are not considered as qualified technicians who can independently complete the work. In other words, in the first two links, the students do not have the basic abilities that the “employees” in the architecture industry have. But in the on-the-post skill training, students are regarded as or required to be qualified technicians who are able to complete work independently. They are more often regarded as mature “employees”. In this link, the “masters” demonstrate less but answer more about students’ questions in their work to help them analyze their insufficiencies in work and cultivate their abilities to analyze problems and solve problems independently; meanwhile, the students can also acquire tacit knowledge from the “masters”, which helps them deepen their understanding of the architecture industry. After the on-the-post skill training, the students can further deepen their perceptual knowledge of the architecture industry and improve comprehensive abilities by solving various problems independently, thus developing the basic abilities that the architecture industry required on the whole.

**Safeguard Measures for the New Practical Teaching Model of “Apprenticeship System”**

In order to truly achieve the all-win goal of “the students improve practical skills, enterprises obtain better benefits, and schools improve talent cultivation quality”, a series of safeguard measures for the new practical teaching model of “apprenticeship system” are necessary. Specifically, customizing targeted practical teaching scheme, enriching practical teaching models to inspire innovative thinking, improving the system’s evaluation criteria, and combining “inviting outside masters in” with “sending students out” are the important safeguard measures.

**Customizing Targeted Practical Teaching Scheme**

The traditional practical teaching has a lot of problems due to the restrictions of practice site, equipment for practice, teaching staff for practice, etc. For example, the practice is not targeted, which cannot customize targeted practical teaching scheme according to students’ characteristics; the practice and the school teaching are disconnected and there is a certain gap between the practice and the students’ cognitive levels, which seriously discourages students’ enthusiasm for practice; the school teaching emphasizes too much on teaching and the planned practice content doesn’t match to the work of enterprises, which affects the enterprises’ enthusiasm for school-enterprise practice, etc. Under the new practical teaching model of “apprenticeship system”, the “three combinations” are taken as teaching content design standards, namely, the combination of practical teaching content and current learning situation of students, the combination of practical teaching content and job requirements, and the combination of practical teaching content and the actual production of enterprises. The practical teaching content should be consistent with current learning situation of students because if it exceeds current learning situation of students, the students’ self-confidence in further study will be affected. Considering the career development of students, the practical teaching difficulty may be a little higher than the learning situation of students. The good and sustainable practical teaching must take into account the actual needs of industry development and bring tangible benefits to enterprises through practical teaching, for which the practical teaching content is required to be combined with the actual situation of the industry and closely related to the students’ career development and industry development. Therefore, it is also necessary to combine practical teaching content with the professional posts of students in the design of practical teaching content. Customizing targeted practical teaching scheme can satisfy students, enterprises, and schools simultaneously and achieve an all-win situation.
Enriching Practical Teaching Models to Inspire Innovative Thinking

The traditional teaching model of “apprenticeship system” is generally that the “masters” teach actively and the students learn passively, which lacks communication and exchange. There is a great difference between the new practical teaching model and traditional teaching model of “apprenticeship system” in Architectural Design. The new practical teaching model of “apprenticeship system” emphasizes students’ operation abilities, creative thinking, innovative consciousness, and practical problem-solving skills. It changes the traditional teaching model by refusing to adopt cramming education and seeking more effective teaching methods to make the teaching simple but profound and more vivid and interesting; it introduces social focus and new technologies of the industry into teaching to attract students’ attention, thus arousing their interest; it enables the teaching to be more diverse in content, form, and method, such as multimedia teaching, case teaching, simulation of practical project, teaching through visiting, participating in design competitions, etc. Such a new practical teaching model of “apprenticeship system” can widen the students’ horizons, enhance their learning initiative, enrich their design concepts, and stimulate their innovative thinking.

Improving the System’s Evaluation Criteria

The evaluation of the system is a key issue to measure the quality of personnel training for universities. As an important part of teaching, practical teaching judges the quality of teaching from whether students have submitted the practical reports only, and students' practice reports are used as the evaluation criteria. This evaluation model directly causes ignorance of students and teachers about practical teaching, leading to poor practical teaching results, and little improvement of students' overall abilities.

Build a systematic and multi-practical teaching evaluation system. The new “apprenticeship system” practical teaching model divides the practical teaching into three phases, and the evaluation criteria for students in different stages are different, in which students will learn step by step, and the evaluation criteria will also gradually increase with the improvement of their abilities. Taking into account the “masters” accountability is the significant characteristics of “apprenticeship system”, the teaching evaluation should be “masters”-oriented, that is, “masters” can evaluate students according to their learning situation, performance, and degree of progress. From the employers’ point of view, the core reason why enterprises are willing to provide practical teaching platforms for colleges and universities is that they aim to take advantage of the talent advantages and technological advantages of universities to promote their development; therefore, the enterprises’ weight should also be added in the evaluation. If students have participated in certain design competition, they can also be evaluated according to the results of the competition and the degree of progress. In addition, as participants in practical teaching, students may also have self-evaluation, but the weight should be low. In short, the new “apprenticeship system” practical teaching model should be based on “masters” and enterprises, so that the “evaluation” acts as a “baton” to be a motive force for students to learn and protect the “apprenticeship system” practical teaching model to go smoothly. Finally, the practical teaching evaluation given to students should be a long-term multi-angle comprehensive evaluation.

Combining “Inviting outside Master in” with “Sending Students out”

Traditional practical teaching model has short practice cycle, and it is impossible to formulate a practical plan according to students' learning progress, although there are teachers responsible for the tracking and guidance of student practice; moreover, it is difficult for a teacher to face multiple students at the same time. That has led to the failure of tracking and guidance of practical teaching, and teachers and schools do not fully know or even do not know the situation of internship students at all. In other words, the traditional practical teaching model actually created a situation in which nobody is responsible for students’ practical teaching. The new “apprenticeship system” practical teaching model assigns a “master” for five students at the most, who is responsible for guiding, managing and supervising students and helping them to improve their operational skills. It is favorable for grasping the quality of
practical teaching. Given the importance of “masters” in the practical teaching of the “apprenticeship system”, it is necessary to choose excellent ones. The “masters” can come from colleges and universities, but they mainly solve the practical problems in the basic skills training; more “masters” need to be served by industrial professional technicians or managers.

Therefore, the new “apprenticeship system” practical teaching model must adhere to the teaching mode of combining “inviting outside master in” and “sending students out”. The so-called “inviting outside master in” is to invite professional technical personnel from enterprises or other social organizations, such as design institutes, urban construction units, real estate units, etc. to serve as “masters” in colleges and universities, so as to help students form objective understanding through on-site explanations, demonstrations, and lectures on real cases. Outside “masters” can also guide students in the basic skills exercises and special skills exercises in colleges or universities. “Sending students out” means inviting students to learn from construction sites during social practices and graduation practices by mobilizing multiple forces such as the university, students, and families and closely liaising with enterprises and other organizations, thus improving the practical abilities of students. In principle, during the on-campus learning stage, teachers will be the main ones, and the outside “masters” will be the supplements. In the off-campus practice stage, the “masters” will be the main part and the teachers will be the supplements. “Inviting outside master in” of off-campus masters and “sending students out” of students require the teachers to maintain full contact with the “masters” outside, so as to dynamically track students’ practical skills level, and discuss improvements of training program.

The Effectiveness of the New “Apprenticeship System” Practical Teaching Model

In recent years, Yunnan Agricultural University has been actively promoting the “apprenticeship system” practical teaching in the architectural major and has achieved good results. Specifically, the effectiveness of “apprenticeship system” practical teaching model mainly includes: it has promoted students’ tacit knowledge acquisition, increased both parties’ satisfaction with the on-the-post internship, and strengthened students’ comprehensive ability.

It Has Promoted Students’ Tacit Knowledge Acquisition

In theory teaching in schools, only the transmission of explicit knowledge was achieved; however, in the concrete practice of the construction industry, there is a lot of knowledge that is difficult to express and communicate through language, and there is even a lot of knowledge that cannot be explained by modern science. Students need to understand the tacit knowledge in their experiences. The “masters” with rich experience can help students understand the knowledge as soon as possible. Students can repeatedly experience and train the tacit knowledge in the communication with “masters”, which will enhance their perceptual knowledge of the construction industry. In short, the new “apprenticeship system” practical teaching model promotes the integration of theory and practice, and realizes the organic integration of rational knowledge and perceptual knowledge.

It Has Increased Both Parties’ Satisfaction with the Internship

In the past teaching practice, especially in the comprehensive skill training and the on-the-post internship, enterprises generally believed that students’ degree of participation was low, and students believed that enterprises did not provide real internship environment; as a result, both parties’ satisfaction degree with practical teaching was low. However, after applying the new “apprenticeship system” practical teaching model, and clarifying the main responsibilities of the “masters” in practical teaching, practical training bases have brought benefits to enterprises, and some practical projects have been introduced to students through practical teaching, saving design costs, and even providing new ideas for design programs; at the same time, some enterprises have also acquired excellent reserve talents and signed labor contracts with students during the on-the-post internship; from students' point of view, the new “apprenticeship system” practical teaching model allows students to better grasp the skills of the construction industry and enhance their comprehensive capabilities; from the university’s point of view, the appliance of the new
“apprenticeship system” practical teaching model has improved the quality of personnel training, and enhanced the social reputation of the college and the university significantly.

**It Has Strengthened Students' Comprehensive Ability Significantly**

The new “apprenticeship system” practical teaching model has enhanced the comprehensive ability of students. Taking the team led by two architectural design professionals as an example, the team has received a total of more than 30 awards at the national, provincial, and school levels in 2013-2017, such as the special award in National BIM Graduation Design Competition, the special award in Building Design Competition for Undergraduates for many times, the first prize in Yunnan Computer Design Contest for Undergraduates, and the second prize in National College Student Computer Design Contest for Undergraduates. It has not only broken the record of zero first-prize in Yunnan provincial competitions and zero first-prize in national competitions, but also improved the publicity of the college and majors, as well as the professional ability of students; meanwhile, students’ feeling of self-efficacy has been significantly enhanced. Many students have become confident after graduation and have achieved good career development.

In a word, new “apprenticeship system” practical teaching model can fully mobilize deep participation of enterprises and improve the pertinence and effectiveness of practical teaching in modern colleges and universities, thus making teaching be based on cultivating basic capabilities, enhancing professional skills, and developing innovative thinking, and realizing the organic combination of practical teaching and industry and positions. This type of practical teaching model is conducive to implementing practical teaching and enhancing students’ knowledge of the construction industry, so it is an effective practical teaching model.

**Acknowledgement**

This research was financially supported by the Foundation of Exploration and Practice Research on the Training Mode of Innovative Talents in Architecture and Planning (2017YAUJY095), The Concept and Strategy of Curriculum Group Construction for Engineering Majors in Southeast Asia—Taking Civil Engineering as an Example (2017YAUJY093), and Reform and Practice of Teaching Evaluation and Evaluation Method of "Engineering Economics” Course (2017YAUJY089).

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