

The Innovative Applied Talents Training Mode based on Studios in the Engineering Majors of Local Universities

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Abstract. In response to the transformation and development of undergraduate universities, the college of engineering and technology of Zunyi Normal University has explored and practiced a studio-based innovative and applied talents training mode. Compared with the traditional talent training mode, the studio-based mode has the following characteristics: aiming at the complementarity between extracurricular training and in-class training, jointly supporting the talent training goal of Emerging Engineering construction; by interest-oriented, establishing student teams and promoting student to independent study; improving the students' innovative ability by innovation and entrepreneurship training program of undergraduates and academic competitions; focusing on the applicability and developing the practical application skills of the potential job. This paper clarifies the motivation, connotation, characteristics and content of the studio-based mode.

Keywords: Studios, Talents Training Mode, Innovative, Applied, Engineering Majors.

1. Introduction

In 2015, the Ministry of Education of the People's Republic of China issued the "Guidance on Leading the Transformation of Local Undergraduate Universities to Applied Types" [1] (hereinafter referred to as "Guidance"). The Guidance points out that as the economy enters the "new normal", the personnel training structure and quality of current higher education are not yet adapted to this revolution, especially the shortage of applied, composite and innovative talents. The Guidance proposes to promote the transformation and development of some local undergraduate universities to enhance the ability of local universities to serve regional economic and social development. At the 19th National Congress of Chinese Communist Party, presidency Xi Jinping made a keynote report [2]. The report once again clearly pointed out that "China Economic development has entered a series of profound changes such as the "new normal", and clearly requires "improving the vocational education and training system, deepening the integration of production and education, school-enterprise cooperation", and "achieving the connotative development of higher education."

In order to accelerate the transformation and development of local universities, at the end of 2015, the Education Department of Guizhou Province decided to identify five universities, including Zunyi Normal University, as pilot universities. The College of Engineering and Technology of Zunyi Normal University was established in 2013. Combining the reality of local social and economic development, the College now has three first-level disciplines: Electrical Engineering, Civil Engineering and Mechanical Engineering, setting up four undergraduate majors: Electrical Engineering and Automation, Civil Engineering, Mechanical Design, Manufacture and Automation, Engineering Cost, as well as one specialized major: Electrical Automation Technology. The College now has five teaching and research offices: Electrical Engineering, Mechanical Engineering, Civil Engineering, Industrial Design and Engineering Cost, and has established the Product Teaching & Research Base of Special Casting of the Education Department of Guizhou Province. The College has also undertaken the Excellent Engineer Education Training Plan of Electrical Engineer and Civil Engineer of Guizhou Province. Combining the training objectives and construction priorities of engineering majors, the College of Engineering and Technology actively explores the measures and ideas of higher education reform in teacher construction, curriculum system, teaching methods and practical teaching in the context of the transformation of general universities into application, and trying to establish a new training model for the cultivation of innovative and applied talents in engineering majors in local universities.

2. The Origin of "Studio-based" Talent Training Model

The studio-based teaching model originated from the cradle of modern design education — Bauhaus [3]. Bauhaus Institute originally proposed the concept of “workshop” for artistic creation and teaching, and then took the “workshop” as the prototype, proposed a “studio-based” teaching mode that integrates theoretical teaching and skill training. The art & design major in the domestic undergraduate universities firstly introduced the “studio-based” teaching mode, which dates to the 1980s. Up to now, more than 300 universities with art & design majors have adopted the “studio-based” teaching model.

Relatively speaking, the exploration of engineering majors in undergraduate universities started late in this field, but also achieved some achievements: the College of Mechanical and Electrical Engineering of Hohai University conducted a study on the practical teaching mode of “design studio” in engineering colleges [4]; School of Materials Science and Engineering of North Minzu University carried out a training model of practical and innovative ability of engineering majors based on subject competitions [5]; College of Mechanical and Electrical Engineering of North Minzu University conducted the personnel training model research in engineering colleges for ethnic universities [6]; Georgia Institute of Technology established the invention studio as “makerspaces” and effectively promote the innovation, creativity and entrepreneurship of engineering students [7]; India's Mysore Medical College also applied the "studio system" teaching model in medical education [8]. It can be said that the core concept of the studio-based on "the combination of theoretical knowledge and practical training, highlighting the ability to create innovation" still has a profound impact on world education.

3. The Connotation and Characteristics of "Studio-based" Talent Training Model

The traditional studio takes professional teachers (or famous teachers and leaders) as the core, students as the object, studio as the carrier, teaching task as the main line of activity, and the classroom management, teaching design and teaching evaluation are all under the guidance of teachers. This belongs to the professional skills teaching mode of "teaching-production-practice" trinity. [9,10]

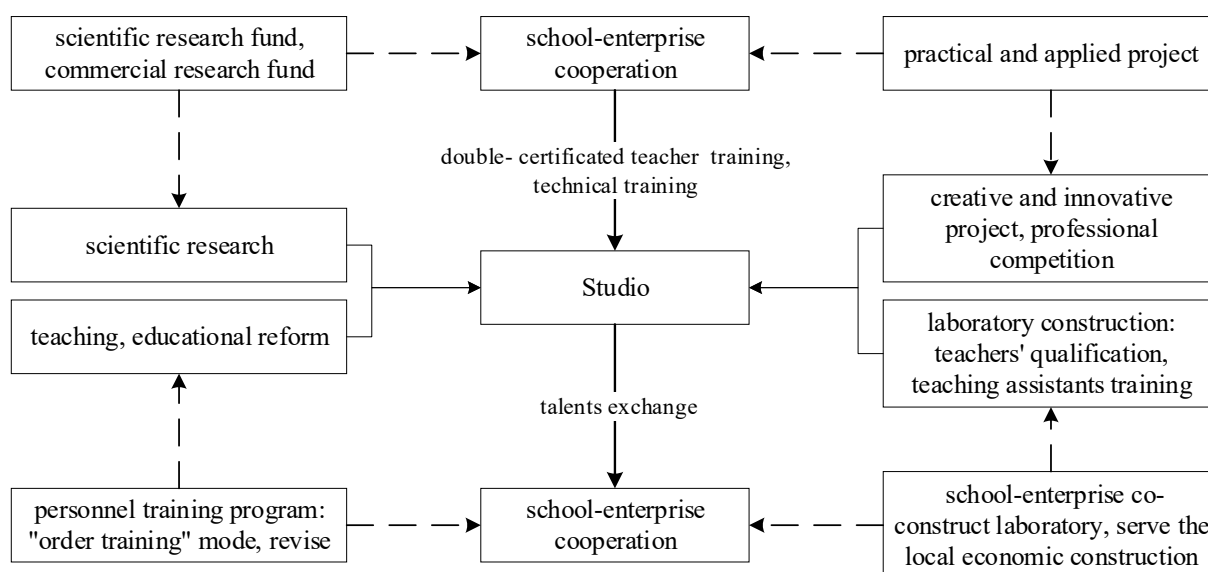


Fig. 1 The connotation and characteristics of proposed "studio-based" talent training model

The studio-based innovative and applied talent training model proposed by the College of Engineering and Technology of Zunyi Normal University closely follows the “Guidance” of the Ministry of Education. As shown in Figure 1, the new studio-based model is clearly centered on the studio, supported by the teaching and research office, with the teacher team as the core, interest-

oriented, regarded innovative and applied talents as the training goal, aimed at improvement of the atmosphere of learning and education. Also, new studio-based model treated the professional competition as important link, the double-skilled construction as the driving force, and the school-enterprise cooperation as the breakthrough.

In "studio-based" mode, the student growth path is shown in Figure 2. From the beginning of university, as the freshman, the students can apply to join the corresponding studio according to their interests and professional direction. The students will be completed under the guidance of the teacher from professional courses, curriculum design to graduation thesis(design). Once students enter the studio, they have a lot of roles. They can be project members, teaching assistant, and laboratory student leaders. And they also can enter company as the internship or prepare for the graduate school entrance exam with the help of the studio tutor. At the end of the undergraduate period, the studio director can also recommend employment units for students or recommend postgraduate schools to help their further studies. The College of Engineering and Technology is actively exploring and practicing to make the new "studio-based" talent training mode as the breakthrough for the transformation of our college and even our school.

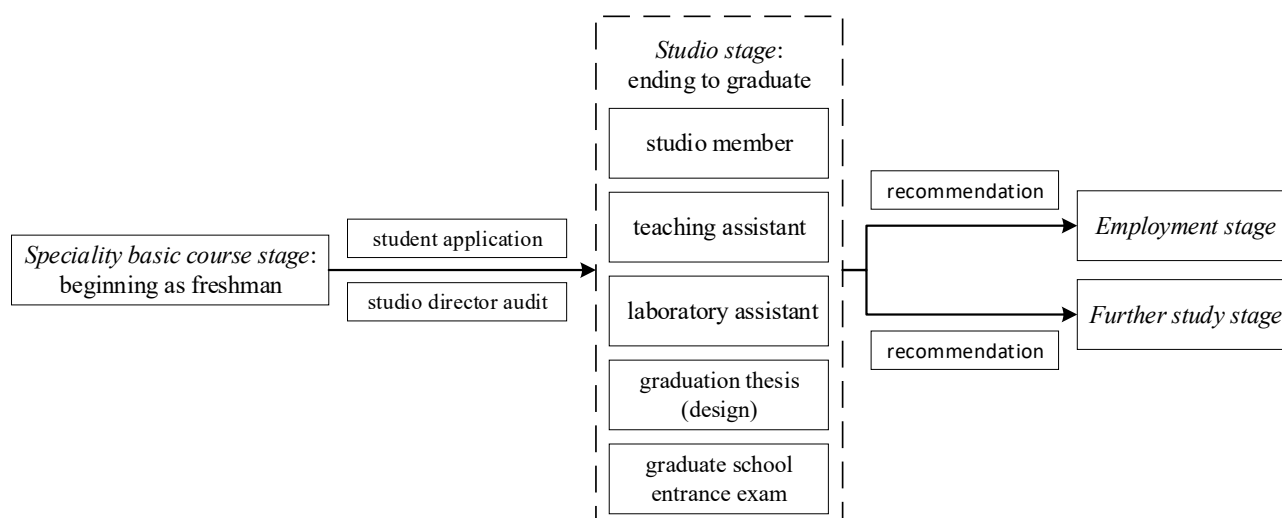


Fig. 2 Growth path in the proposed "studio-based" talent training model

4. The Main Content of "Studio-based" Talent Training Model

4.1 Forming a Studio-based Innovative Application Talent Training Model.

Taking the studio as the carrier, the project and the competition as the breakthrough point, through the establishment of a sound studio management system and the student growth mechanism, strengthen the initiative of students' extracurricular learning, and highlight the cultivation of the ability of innovation and entrepreneurship, to make up for the shortcomings of the conventional classroom teaching and experimental practice teaching mode and to meet students' understanding of the integrity and complexity of engineering problems. At the same time, through the whole process of specific projects and competition of the studio, students can effectively improve the systematic planning of a large number of extracurricular times, and enhance the team spirit and also reduce the pressure of student management.

4.2 Form the Standard for Setting up a Studio.

Based on the existing software and hardware facilities of the laboratory, according to the degree of software and hardware facilities to meet the projects functions, combined with the students' foundation of comprehensive ability and the demanding of innovation ability training, through the rational planning of the main research direction of the proposed studio to form the selection criteria for the laboratory upgrade to the studio. During the studio construction, adding auxiliary equipment and materials to meet the requirements of studio function integrity.

4.3 Develop a Management Mechanism for the Studio.

Based on the research direction of each studio, students who are interested are encouraged to join the studio, and the students could raise their research interests under the support of the studio software and hardware. Adhere to the studio open all-weather, implement student self-management, support students to theoretical study, exchange seminars, and experimental production of new ideas arising from the project research process, and gradually guide the studio to become the main place of residence for students. At the same time, strengthen the daily assessment of students' work content and input status, promptly persuade students who have no planning content, do not participate in studio discussions and activities for a long time, and work content that is not related to the research direction of the studio, to withdraw from the studio or to transfer to other studio with relevant research directions.

It should be clearly that the studio does not regard simple verification experiments as the work content, does not grasp the specific knowledge points as the work objectives, and does not use the unique results as the assessment criteria. Instead, it takes the research and exploration of the project as the work content, overall solution of the project as the work objectives, work interest and input status as the assessment criteria.

4.4 Develop a Learning and Growth Mechanism for the Studio.

The project and competition with engineering application value are used as the work content of the studio, and targeted to the local characteristic industry and advantageous industries, providing technical support for serving local social and economic development. At the same time, relying on projects and competitions, it will promote the improvement of students' cooperation ability and time management ability.

In the execution of the project, it is carried out in the form of division of labor and cooperation. Through the review of materials and hands-on practice to complete the own module of the project, and the association and integration of the project modules are completed through regular exchanges mechanism. Meanwhile, the common problems encountered in the project are handled through the special lectures given by the studio instructors.

5. The Innovation of the "Studio-based" Talent Training Model

① the studio-based innovative application ability training, it highlights the independent learning and application of professional knowledge with local industry enterprise characteristics, making up for the shortcomings of conventional classroom teaching and experimental practice teaching mode, meeting students' understanding of the integrity and complexity of engineering problems. Through the systematic learning of the profession basic knowledge of the in-class teaching and the extra-curricular training of key technologies in the professional field, there will jointly promote the achievement of the goal of training talents in local universities.

② Through the management system of the studio, students are gradually gathered into the studio, which effectively diversifying and reducing the difficulty of student management, and promoting the benign transformation of the study atmosphere.

③ Through the learning and growth mechanism of the studio, students completed the systematic planning of a large number of extracurricular times. Through long-term focused training and accumulation, which effectively promoted students' understanding of professional knowledge systems and practical complex engineering problems.

④ Through the work content and operation mechanism of the studio, the students will be supplemented with the professional technical knowledge and the latest development information needed for the development of the local industry in a timely manner. The professional knowledge system built with the in-class teaching will support the local economic and social development. The ability to demand for professionals. At the same time, it has cultivated students' teamwork ability and time management ability.

6. Summary

Local universities should cultivate qualified applied talents for the local region. It is necessary to study the appropriate innovative and applied talent training mode based on the characteristics of local undergraduate students and the teaching rules of engineering majors. Taking the construction of the engineering professional studio of Zunyi Normal University as an example, this paper analyzes the connotation characteristics of the new "studio-based" mode, the students growth path in the studio, and discusses the concrete measures and methods of the "studio-based" model. The specific measures and methods provide a reference for the transformation and development of local universities.

Acknowledgments

This research was financially supported by the Cooperative Education Project of Ministry of Education of China (No. 201701074015, No. 201701061006), the Excellent Talent Education Training Program of Education Department of Guizhou Province of China, Undergraduate Teaching Content and Curriculum System Reform Project of Education Department of Guizhou Province of China (2017520084).

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