
Training System of Application-oriented Talent with Innovative Thinking to Mechanical Engineering Program based on Supply Side Reform

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Abstract: Based on the background of innovation and entrepreneurship education and university transformation, combining the actual situation of regional colleges and universities, we, guided by "CDIO model curriculum reform", linked of "three competitions - three training - three incorporation mode", interfaced with "three creations and one result mode", combined innovation and entrepreneurship with the transformation of university application-oriented, built a training system of cultivating application-oriented talents with innovative thinking. It provides a kind of reference and thought for colleges and universities to realize university-enterprise cooperation better.

Key-Words: *Innovation and entrepreneurship, Transformation of colleges and universities, CDIO, University-enterprise cooperation*

1. Research Background

The "supply-side reform" in colleges and universities is to train right students to match the need of the enterprise developing rapidly. At present, Chinese society is in the stage of industrial transformation and upgrading and rapid development of public services. It requires a large number of technical talents with innovative thinking. Regional universities should seize this opportunity, insist on cultivating student's innovative thinking, innovation and entrepreneurship' awareness, guided by social and business needs that will solve the contradiction between supply and demand of human resources [1].

The radical purpose of education is to train high-quality talents. For Mechanical Engineering Program, students, besides learn the basic professional theory, should further focus on the training of practical application ability about mechanical knowledge. Sticking to innovative education and cultivating a large number of innovative talents is a new requirement for the

reform and development of education in the new period. The development and training of innovative consciousness, innovative thinking and innovation ability are the more essence and core content of the education.

2. The Beginning of Project Research

The reform of this project began in 2011. Nowadays, how to do "supply-side reform on education", how to cultivate application-oriented talents with innovative thinking, how to let old major maintaining youth vitality forever. Those questions are all teachers in the research group have been thinking about. All members of the team are excellent teachers, including 3 professors, 2 associate professors and 4 lecturers with 3 PhD and 6 MSE. They all have rich teaching experience, and many years of experience in scientific research and innovative competition. They can carry out the concept of practice and innovation well throughout the teaching process and provide a strong guarantee for the research of the subject.

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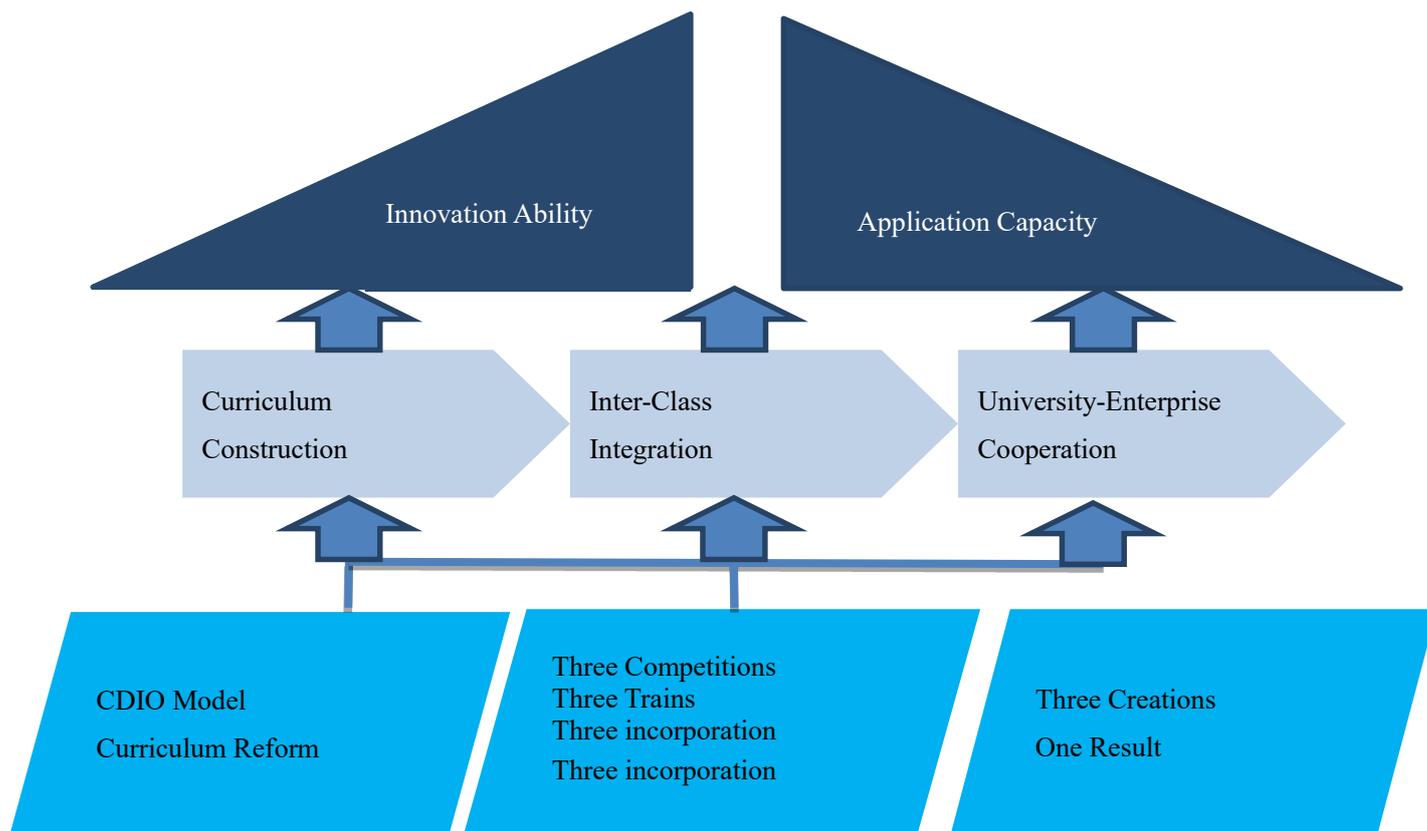


Figure 1 An architecture diagram of applied talent training system with innovative thinking

3. Framework of the Training System

After several years of exploration and practice, we gradually formed the "CDIO mode curriculum reform" as the guide, linked of "three competitions - three training - three incorporation mode", interfaced with "three creations and one result mode", combined innovation and entrepreneurship with the transformation of university application-oriented, and built a system of training application-oriented talents with innovative thinking. We bravely changed the traditional way of assessment, combined the specific features of specialized courses, created the engineering practical atmosphere on mechanical courses, so that students can acquire more knowledge in the limited time, which will improve their learning initiative, study and practice innovation ability, solve the harmony problem on supply and demand side to adapt to the society development.

4. Specific Measures and Methods of the Training System

4.1 CDIO model curriculum reform

It is based on the CDIO education concept, and builds the project-based curriculum system. CDIO engineering education mode is the latest development of education reform in recent years, which represents Conception, Design, Implementation and Operation [2]. It takes the life cycle from product research and development to product operation as the carrier, making students can learn engineering theory, technology and experience in the way of active and practical courses. The ability of CDIO mode to cultivate students is divided into four aspects: engineering basic knowledge, personal ability, teamwork ability and engineering system ability. According to the concept of CDIO, combined with the guiding ideology of "learning in doing", following the idea of the "level 3 projects in multiple courses extending to comprehensive level 2 projects, and level 2 projects serving for level 1 project", we constructed project-based curriculum system.

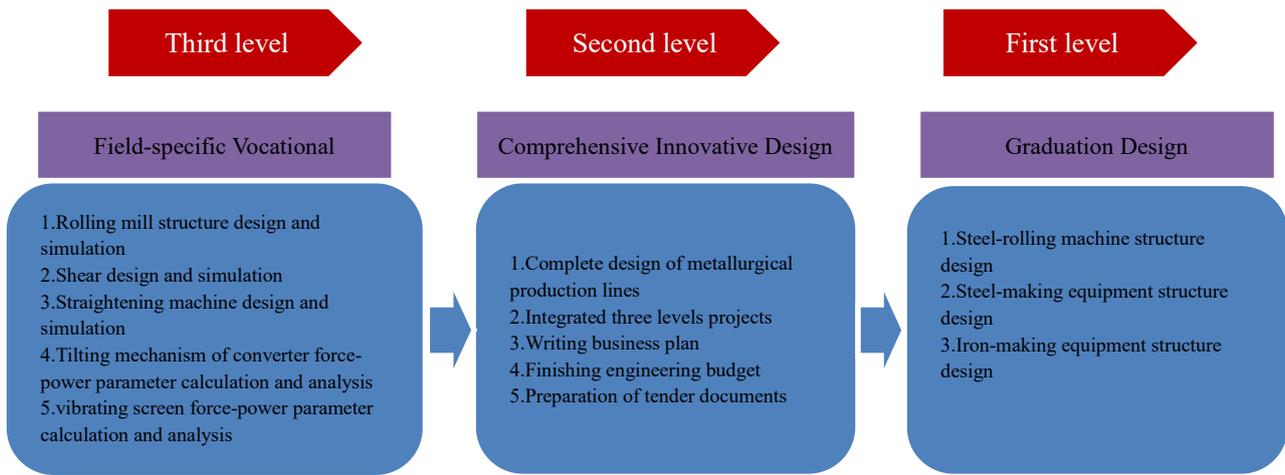


Figure 2 The curriculum system under CDIO mode

The specialized courses are divided into several No. three-level projects according to the teaching content. The students are divided into groups to complete different tasks, through independent study, group discussion and cooperation, individual work, and finally complete projects together. After the completion of the project, the project team will provide the design drawings, the project reports, and make the PPT presentations. The teachers assess the performance of the project according to the implementation of the project and the quality of the paper reports, the logic and accuracy of the PPT oral presentations, and the self-assessment of the students.

4.2 "Three competitions, three training, three incorporation" mode

The process reform of "three competitions, three training,

three incorporation" is the link between classroom teaching, innovation and entrepreneurship education and scientific research training. "Three competitions" refer to Mechanical Innovation Design Competition, Innovation and Entrepreneurship Training Projects and Creative Engineering Design Competition (CEDC). "Three training" mainly include innovative thoughts training, course training and scientific research training. "Three incorporation" refer to the interaction between course training and innovation competition, between innovation competition and scientific research training, between scientific research training and curriculum training [3]. In short, it is the combination of three kinds of training that enables students to improve their innovation ability and professional practice ability [4].

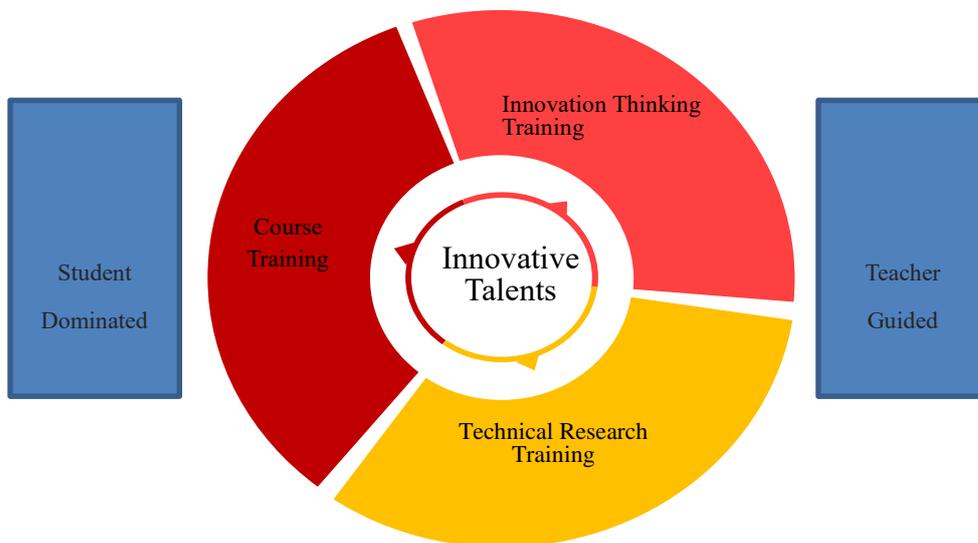


Figure 3 "Three competitions, three training, three incorporation" process training

4.3 "Three creations and one result " mode

The aim of "three creations and one result mode" is to create an interface to meet the cooperation between colleges and enterprises. It includes Creating innovation, creating profit, creating entrepreneurship and getting Results. "Creating Innovation" refers the idea is a new breakthrough in traditional teaching mode, due to "everything starts from practice". "Creating profit" refers to create certain economic benefits and to compensate the college teaching expenses; "Creating entrepreneurship" refers to apply industrial teaching reform and imitate enterprise internship. The teacher is the chief engineer; the student is the application engineer. The relationship between teachers and students will transform to some extent into the subordinate relationship as the actual production workshop of modern enterprises, and greatly shorten the adaptation period of students after graduation in similar enterprises. "One result" is getting a bunch of results, including educational reform, scientific research, teaching documents, etc. In short, we, through the integration of college resources to take the form of university-enterprise cooperation, build a practice teaching base which is not only suitable to college but also fit factory, not only allow the student participation but also meet the industrial requirements seamlessly [5].

5. Conclusions

It has always been the goal of the research group to construct an application-oriented talent training system with innovative thinking. After several years of exploration, Mechanical Engineering Program of University of science and technology Liaoning have gradually formed their own specialties.

Guided by "CDIO model curriculum reform", the third-level projects in the course is expanded into the second-level projects of curriculum design, and finally completed the first-level project of graduation design. Adopting the engineering design method to complete the training of students is so that students can adapt to the requirements of the enterprise as soon as possible.

"Three competitions, three training, three incorporation

mode" focus on training of innovative thinking, vocational course and scientific research abilities, it is using innovation competition to attract students to participate in the innovative activities, thus stimulating students to put interests in scientific research and making the students to have learning goals inside and outside class.

The "three creations and one result mode" solves the problem of the "last kilometer" of college-enterprise cooperation. By integrating the resources of the university, we will adopt the form of school-enterprise cooperation and build a training base which is located on the school, operating according to the enterprise model and satisfying the needs of the university and enterprises. This might be one of future trend of university-enterprise cooperative practice education.

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