

Research on the Training Mode of Mechanical Innovation and Entrepreneurship Talents Based on "Industry-University-Research" Integration

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Abstract: This paper analyzes the existing problems in the cultivation of innovative and entrepreneurial personnel in colleges and universities, starting from the educational advantages and characteristics of the integration of "production, study and research", aiming at the cultivation of innovative and entrepreneurial personnel, and combining the current situation and characteristics of the cultivation mode of innovative and entrepreneurial personnel in mechanical majors, build the "production" mode mechanical innovation ability of entrepreneurial talent training mode, explore the "production" mode mechanical professional personnel training mode of innovative undertaking specific implementation measures, effectively improve the mechanical student's innovative spirit, the pioneering consciousness and engineering practice ability, improving the cultivation of innovative talents system, for mechanical engineering personnel training mode innovative undertaking to provide the reference.

Keywords: Mechanical; Industry-university-research; Innovative undertaking, talent cultivation; Practical ability

1. Introduction

The continuous deepening of innovation and entrepreneurship education reform in colleges and universities is an urgent need to implement the national strategy of innovation-driven development and promote economic quality and efficiency upgrading. It is also an important measure to promote the comprehensive reform of higher education and promote higher quality entrepreneurship and employment of college graduates [1]. Due to the strong specialty and high application of engineering, the talent cultivation of mechanical majors should pay more attention to enhancing students' comprehensive quality and innovation and entrepreneurship ability. Especially in the current background of engineering education professional certification and "new engineering" construction, how to promote the cultivation of innovative and entrepreneurial talents in mechanical specialty is a major issue urgently needed to be solved in the construction of mechanical specialty [2]. "Industry-university-research" is a new teaching mode, which is the unity of production (enterprise), study (university) and research (scientific research institution) [3]. This education mode is to make full use of all kinds of advantageous resources to achieve resource sharing and maximum use of resources [4], link

the theoretical knowledge in the classroom with practical operation, and strengthen the effective combination and connection between schools and enterprises, so as to promote the cultivation of innovative talents [5].

2. Problems Existing in the Training Mode of Mechanical Innovation and Entrepreneurship Talents

- (1) The practice teaching system is weak, lacks the independence and the system Mechanical professional knowledge of basic theory, and production practice closely combined [1]. After the completion of many theoretical courses, there is a lack of links directly used to guide production and practice, and students lack perceptual knowledge, resulting in the disconnection between theoretical teaching and practical teaching, which cannot complement and promote each other, which is not conducive to the cultivation of students' innovation ability [6].
- (2) Professional teachers lack the awareness and ability of innovation and entrepreneurship education, and their teaching methods are single and pertinence is not strong. Most university teachers are doctoral graduates without working experience. Despite their strong scientific re-

search strength, they lack practical working ability, which can only provide students with theoretical knowledge but fail to cultivate their application ability. Because teachers do not contact with actual production for a long time, they cannot keep pace with The Times and cannot give specific guidance to students in joint practical training. They often ask students to follow the experimental steps directly, which is lack of flexibility and innovation [7].

(3) Innovation and entrepreneurship concept lags behind, not closely combined with professional education, and divorced from practice.

Although many universities have included innovation and entrepreneurship courses in compulsory courses, the connection between innovation and entrepreneurship courses and mechanical professional courses is weak, and the curriculum system is not perfect. The innovation and entrepreneurship tutors in universities are concurrently taught by teachers. The lack of practical background and experience in innovation and entrepreneurship is not conducive to cultivating the innovation and entrepreneurship ability of college students [8].

(4) Lack of innovation practice platform, guidance and assistance is not in place, resulting in students' engineering practice ability, innovation and entrepreneurship ability is not strong.

Enterprises are not willing to accept college students internship, internship units difficult to solve. Many enterprises in China are not willing to accept college students for internship. On the one hand, they are worried about safety and other problems; on the other hand, they have tight production tasks and worry about affecting normal production. At the same time, they cannot accept a large number of students for a long time [6].

3. Construction of the Training Mode of Innovation and Entrepreneurship Ability of Mechanical Specialty under the Mode of "Production, Study and Research"

3.1. The basic principles of the establishment of innovation and entrepreneurship personnel training mode for mechanical majors under the mode of "production, study and research"

(1) The combination of production and learning, with production and study, to cultivate the practical ability of mechanical talents.

Mechanical engineering teaching is ultimately in order to better applied to practical production process, train a large number of technical applied professionals, according to production needs [4], determine the course training scheme, establish enterprise demand oriented education target, through the teaching of related professional theory knowledge, learning and melting body to the production

practice in a line to concrete production practice, applying theoretical knowledge to the production practice, the significance of this is to produce student, finally realizes the knowledge, cultivating talents of machinery practice ability.

(2) The combination of learning and research, with learning to encourage research, to cultivate the innovative ability of mechanical talents.

Physical, mechanical engineering knowledge in many contents about design method, is not simple to understand theorem, the concept, calculation method, but from the point of view of engineering application to understand and master [10], so students in the learning theory knowledge, to mainly in the form of projects involved in mobilizing their enthusiasm, initiative and creativity, which is the core of the cultivation of innovative entrepreneurial talent. Project participatory innovation and entrepreneurship talent cultivation is a scientific research project in which students participate in teachers. It takes "student-led -- teacher-guided -- multi-participation" as the main method to establish innovation and entrepreneurship awareness and atmosphere [11].

(3) Research and production combined, with research and oxytocin, to cultivate the entrepreneurial ability of mechanical talents.

Through the combination of research and industry, the innovation achievements of scientific research can be transformed into a specific industry, which will not only promote the regional economic growth, but also form and reflect the entrepreneurial ability for students' career development. In the process of theoretical knowledge, production practice and project participation, students' innovation consciousness and innovation ability are constantly stimulated, and then this ability is transformed into entrepreneurial ability, thus forming a virtuous circle of "study with oxytocin" [12].

3.2. The mode of cultivating innovative and entrepreneurial talents in mechanical majors under the mode of "industry-university-research"

(1) Reform the curriculum system for innovation and entrepreneurship, and implement a multi-level "research assistant" system.

Firstly, combined with the basic courses of mechanical majors, innovation and entrepreneurship courses are introduced. Entrepreneurship curriculum system, secondly, in order to further improve the innovation in the process of "industry-university-institute" cooperation, encourage teachers introducing scientific research subject curriculum, actively undertake research and development of enterprise innovation projects, lead and guide the students to participate in the development of science and technology, scientific research and innovation and entrepreneurship practice, formed "teachers, graduate students, undergraduates" pyramid of research-oriented learning

team [13], establish a distinctive "consciousness cultivation, interest cultivation, actual combat skills, practice hatch" four steps innovation entrepreneurship education curriculum system [5].

(2) Build a comprehensive innovation and entrepreneurship practice platform and strengthen the training and internship process

The establishment of innovation and entrepreneurship practice platform is of great significance to cultivate the innovation and entrepreneurship ability of college students. To build a school-enterprise cooperation platform and improve the school-enterprise collaborative education system, relevant enterprises can set up some special positions according to the actual needs of their own units, and enhance students' practical ability through the principle of specialized post and specialized training.

The establishment of enterprise practice base enables students to participate in work practice in accordance with the actual production and manufacturing process of the enterprise, so as to acquire work experience and enterprise practice and assessment ability, enable students to quickly transform into the role of social person, and truly realize school-enterprise collaborative education and assessment [14].

(3) Science and technology competitions will be held to enrich the teaching model of innovation and entrepreneurship.

Vigorously promote competition and majored in mechanical engineering practice training game, innovation, invention as the core, strengthen the open laboratory and practice base, provide the better practice environment, strengthen the organic combination of theory and practice of students, helps the student to the direction of future employment orientation, more help to stimulate students to participate in the enthusiasm, cultivate students' innovative thinking ability, at the same time the implementation to promote learning, in order to promote teaching and to promote change, and using the credits replacement as the drive power of students in competition.

(4) Give full play to the professional advantages of enterprise experts.

According to the curriculum setting, enterprise experts are introduced and their own advantages are utilized to implement the "project-guided curriculum teaching method". Taking enterprise project cases as the main line, basic teaching contents of various courses are introduced to guide students to directly apply knowledge to solve practical problems. Business experts to research projects in the longitudinal and lateral direction, on the basis of combination of subject and the knowledge structure and degree of undergraduate students, set up a number of undergraduate course graduation design topic, at the same time, give full play of the role of "production base in the graduation design, all of the students' graduation design process in the corresponding production base, to

make the students accept engineering practical work, and subtly learning mentor's work style and methods, is helpful to improve the comprehensive quality of students [13].

4. The Specific Measures of Cultivating Innovative and Entrepreneurial Talents In mechanical Specialty under the Mode of "Industry-University-Research"

In the first year, offered basic courses of innovation and entrepreneurship for students majoring in machinery, mainly teaching courses such as «innovation method» and «innovation principle». Association of the establishment of "CAD", "3 d modeling association", "3 d printing association", "hui fish association" and so on the platform for innovation, descriptive geometry and mechanical drawing, 2 d AutoCAD, 3 d modeling software, and other organic combination of course and into the innovation platform, students can according to their own design of 2 d drawings and 3 d model, adopt the method of 3 d printing process, for students to learn CAD, 3 d software platform, trains the student to have the 2 d design, 3 d modeling, product modeling design, simple mechanical processing capacity; And carry on the enterprise practice observation, understands the production demand, lays the foundation for the follow-up course.

In the second year, on the basis of the basic courses of «mechanical design» and «principle of machinery», and relying on the innovation and entrepreneurship platform, carried out discipline competition and innovation training programs for college students. Participated in the national college students' Internet + innovation and entrepreneurship competition, the national college students' mechanical innovation design competition, the national college students' advanced mapping technology and product information modeling innovation competition, the "challenge cup" national college students' extracurricular academic scientific and technological works competition, and the national college students' entrepreneurship training program. Through participating in national and provincial extracurricular science and technology innovation competitions, it plays an important role in promoting students' comprehensive quality, innovation ability and practical ability, and at the same time plays a leading and exemplary role, creating a strong innovation and entrepreneurship style and school spirit. In the contest at the same time, students can according to your own design, in the engineering training center and processing, the entity to make physical play, in the process of machining, teachers can meet the class of the emphases and difficulties of various closely connected with the production practice through the teaching mode of interpretation, let the students to understand the theoretical knowledge better.

In the third year, offered a professional course of innovation and entrepreneurship, «mechanical innovation design», for students majoring in mechanical engineering. Taught the theory and method of mechanical innovation design, hired experts from different enterprises as instructors, analyzed the examples of mechanical innovation design of different enterprises, and explained the production process of different parts through practical cases. In mechanical professional core courses, give full play to the company familiar with the domain knowledge of teachers, to block type interpretation of professional courses, practice the block "professional course teaching"[13], for curriculum design, teachers can decorate a design task in the introduction, let the student to comb and knowledge to solve in the problem, teachers and school teachers to form a core teaching team, from two aspects of theory and practice of comprehensive curriculum design for guidance. Let students participate in school teachers' scientific research training project and enterprise horizontal topic, to guide students in the project selected topic, literature research, opening report, interim report, an application for a patent for the concluding reports, thesis writing, multiple links such as a workout, to cultivate students' basic scientific research quality and scientific research ability, or continue to lay a solid foundation for graduate school or employment, students also need to enter the enterprise for production practice or engineering test according to the subject content. Enterprise teachers can explain the problems in production as examples to improve students' ability to analyze and solve problems.

Senior, for mechanical engineering students courses in "mechanical entrepreneurship +" etc, and graduation practice for university-enterprise cooperation, arrange students into the enterprise, in all jobs on the field work, from the beginning of choice the choice of blank to the final machining method, be familiar with the company's production process, the real contact production in specific jobs, improve their professional skills, promote students to combine enterprise production, scientific research and practical projects such as the choice of graduation design topic, the enterprise and the double tutorial system in colleges and universities, choose the fit specialty training goal and the basic requirements of the engineering practice subject, joint to guide students to carry out the graduation design, Give play to the role of "school-enterprise cooperation" base in graduation practice and graduation design.

5. Conclusion

With the increasing demand of high-level and high-level mechanical innovation and entrepreneurship talents, the cultivation and management mode of college students also needs constant reform and innovation. On the basis of production-teaching-research combination, actively

promote the mechanical type, with the rapid development of professional personnel training mode innovative undertaking will be organic combination of the two, in the actual teaching process, the effective solution to the lack of practical teaching links, optimize the practice teaching content, perfect the course system, build more good innovation environment, improving the cultivation of innovative talents system, for mechanical engineering personnel training mode innovative undertaking in China to provide the reference.

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