

Construction and Practice of Practical Teaching System for Training Applied Talents of Mechanical Specialty under the Background of New Engineering Department -- Taking Mechanical Design and Manufacturing and Automation Specialty of Changjiang Normal University as an Example

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Abstract: The cultivation of talents in application-oriented undergraduate colleges and universities should pay more attention to the ability to solve complex engineering problems. Practical teaching system is an important guarantee to realize this cultivation goal. As a mature traditional major, the mechanical major needs to optimize the training objectives and curriculum system to adapt to the construction of new engineering. Based on the training goal of applied talents in mechanical specialty, combined with the new engineering construction and engineering education professional certification, this paper interprets the construction of the practical teaching system of mechanical specialty under the background of new engineering from the aspects of professional orientation, talent training scheme and practical curriculum system.

Keywords: New engineering; Application-oriented; Practical teaching; Engineering certification

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The practical teaching system directly serves the goal of talent training, is an important link in the training of applied talents in engineering majors, and directly affects the quality of applied talents training ^[1]. Therefore, the practical teaching department plays an important role in the talent training program, and the engineering education professional certification has made a rigid requirement on the proportion of credits in practical teaching. In the context of industrial transformation and upgrading, the mechanical major urgently needs to be upgraded based on new engineering to adapt to the development of modern science and technology and the needs of multiple talents in enterprises. It is necessary to set up corresponding practical teaching courses to ensure the quality of talent training ^[2]. Deepening the reform of engineering education and advancing the construction and development of new engineering courses have pointed out the direction for the reform and development of mechanical majors .

This article combines the construction of new engineering majors and the reality of mechanical design and manufacturing and automation (hereinafter referred to as machinery) of Changjiang Normal University, starting from a clear professional positioning and talent training goals, and taking engineering education professional certification as the standard to carry out new engineering construction and transformation of the majors, Revise the talent training plan, optimize and adjust the curriculum system, especially the practical teaching system; integrate the ideological and political elements of the curriculum, and take into account the professional

qualification certification, revise and improve the curriculum syllabus from the aspects of curriculum objectives, teaching contents and assessment methods. Finally, a set of practical teaching system can be constructed to truly realize the support of curriculum objectives and training objectives.

1. Takes the cultivation of applied talents as the concept and defines the cultivation objectives of talents

Under the guidance and guidance of the Ministry of Education and other ministries and commissions, many local undergraduate colleges and universities have clearly defined their position as application-oriented universities. Different from research universities, application-oriented universities have the characteristics of vocational education. Talent training should pay more attention to skills, but it is different from the training of middle and senior skilled talents in secondary and higher vocational schools. What needs to be trained is to solve complex engineering problems. High-level engineering and technical personnel, that is, to train engineers .

Through careful study, series of investigations, combined with the school positioning and local industrial economic structure, it is clear that the training goals of mechanical professionals are: for modern manufacturing industries such as automobiles, motorcycles, and equipment manufacturing, and cultivate morality, intelligence, physical, beauty, and labor Comprehensive development, master solid basic theories, professional knowledge and basic skills of mechanical engineering disciplines, with a certain teamwork spirit and international vision, can comprehensively consider social, legal and environmental factors, have good humanities literacy, social responsibility, engineering professional ethics, innovation awareness, sustainable development concepts and good learning and practice, and can be engaged in the design and manufacturing of mechanical and electrical products after graduation Applied senior engineering and technical personnel for development, engineering application, production management, technical services and other related work.

2. To revise the personnel training plan based on the professional certification of engineering education

The talent training program is an important supporting document for the realization of talent training goals. It is the highest top-level design for running schools in various majors. It is the first step in talent training and the fundamental follow for the organization and implementation of education and teaching activities [8]. Taking the opportunity of the revised talent training plan for the whole school in 2019, after clarifying the professional training goals, the engineering education professional certification standards were fully introduced, the talent training plan was revised, and the mathematics and natural science courses were supplemented as required, and the proportion of practical courses was increased. Most professional basic courses and professional core courses are corresponding to offer special weekly practical courses such as curriculum design and experimental training; when the total credits are slightly reduced, the practical teaching hours and credits have been greatly increased (see Table 1) to fully meet the requirements of training applied talents. Constructing two matrices of the support of graduation requirements for training goals and the support of courses for graduation, and inviting industry and enterprise majors to repeatedly demonstrate, forming a new talent training program.

Table 1 Statistics of Credits in Practical Teaching Hours of New and Old Training Programs

Version of training plan	Total credits	Proportion of practical teaching	Total hours	Proportion of practical teaching
Old version	176.5	29.5%	2612	26.2
New edition	175	35.7%	2582	29.6%

3. Taking the construction of new engineering specialty as an opportunity to optimize the curriculum of practical teaching

The mechanical undergraduate major of our school was started in 2008. In recent years, two new engineering majors, robot engineering and intelligent manufacturing engineering, have been newly established. Courses and teachers are shared among the majors. Cross-integrated development supports the construction of new engineering majors with traditional engineering majors, and promotes the transformation and upgrading of traditional engineering majors with new engineering majors. Now, a good situation of coordinated development of intelligent manufacturing professional groups has been formed. At the same time, actively integrate the school's electronic information engineering, communication engineering, computer science and technology, data science and big data technology and other professional teachers and practical teaching conditions, and add "Artificial Intelligence Technology Experiment", "Intelligent Manufacturing Technology Training" and "Industrial Robot Technology Training" and other related courses for robots and intelligent manufacturing.

4. Takes the ideological and political elements of the curriculum as the starting point and excavates the ideological and political elements to revise the curriculum outline

Deeply excavate the ideological and political elements of the curriculum, promote the integration of the advanced achievements of the discipline and the ideological and political elements of the curriculum, combine the achievements of the world factory with the dilemma of neck sticking technology, and establish a sense of national pride and the concept of engineering serving the country; with the spirit of craftsmanship, Professional norms, etc. enhance students' professional and professional confidence. From teaching objectives, teaching contents to curriculum assessment, the ideological and political elements of the curriculum are fully integrated, and the curriculum syllabus is revised,

5. Takes subject competition as the guide and five in one to improve the quality of practical teaching

Guided by subject competitions, guided by industry needs, relying on teachers' scientific research projects to develop practical teaching projects, create practical teaching resources, and explore the five-in-one practical teaching project creation and curriculum assessment system of practical production, teaching and research competitions. Taking into account teaching, scientific research, curriculum thinking and politics, etc., establish a complete system and mechanism, enhance innovation ability, cultivate the synergy of multiple subjects, stimulate the vitality of each training subject, and establish a stable team of instructors and a stable student team passed down from generation to generation, Continue to improve the results of subject competitions and improve the quality of innovation ability training.

6. Vigorously Promote Teaching Reform and Improve the Training Quality of Applied Talents

Constructed and implemented a three-dimensional collaborative model of production-education collaboration, science and education collaboration, and group-education collaboration, effectively integrating school and social resources, forming a joint force and long-term mechanism for practical education; implementing the project-based content of practical courses, dynamic resources, and assessment Modular, platform open reform, standardize the content of practice; expand and consolidate the five practical teaching platforms of professional practice, subject competition, innovation and entrepreneurship, professional associations, and social practice, the scope of practice platform has been broadened and the resources of practice platform have been optimized. The benefit rate of students has been 100%, and the comprehensive ability and quality of students have been significantly improved. "Three, four, five practical teaching reform and practice of mechanical and electrical applied talents training in local undergraduate colleges and universities" won the first prize of school-level teaching achievement.

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