

# *The Reconstruction on Training Mode of Mechanism in Local Universities Based on Outcome-based Education*

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**Abstract**—Engineering education professional certification is an important part of the quality assurance system of higher education in China. Based on the concept of results oriented education, the mechanism specialty of Hubei Institute of technology revised the training objectives and graduation requirements according to the needs. Through a series of reform measures, such as carrying out the reverse design of curriculum system, reconstructing talent training program, innovating practical teaching system, and strengthening the construction of teaching staff, an open talent training mode is gradually formed, which is oriented by output, characterized by the integration of production and education, and aimed at training "order type" applied innovative talents. The practice shows that the implementation of this mode has good promotion significance for the teaching reform of mechanism specialty in local universities.

**Keywords**—Professional Certification, Achievement Oriented Education, Integration of Industry and Education, Personnel Training Mode

## I INTRODUCTION

The goal of outcome-based education (OBE) is to take the peak achievement that students can achieve through the process of education as the standard. Based on the concept of engineering education and professional certification standards of results oriented education, Hubei Institute of technology carried out the reverse design of teaching activities and curriculum design, and revised the graduation requirements of training objectives and mechanism majors in accordance with the national education policy, industry and workplace needs, the school's positioning and characteristics, student development and alumni expectations [1]. Through a series of reform measures, such as the curriculum system and personnel training program, reforming the teaching methods, establishing and improving the continuous improvement mechanism of teaching evaluation, and strengthening the cultivation of teachers' innovation ability, the College of mechanical and electrical engineering has gradually formed a "order"

application-oriented mode, which is oriented by students' achievement output, characterized by the integration of production and teaching. The open talent training mode with the goal of innovating talents [2].

## II ANALYSIS OF THE CURRENT SITUATION OF TALENT TRAINING IN LOCAL COLLEGES AND UNIVERSITIES

Local colleges and universities are an important part of China's higher education. Through extensive investigation and interview, most of them are built after the reform and opening up. Some of them are upgraded to the mixed system of undergraduate and junior college in recent years [3]. Due to geographical restrictions, financial policies, rigid personnel and insufficient student resources, at present, local colleges and universities are in the talent training table the common features are as follows:

- The orientation of running a school is not clear and the expression of training objectives is not accurate. The orientation of a school is one of the main bases to determine the training objectives. Talent training is the task of colleges and universities. Some local colleges often neglect the idea and orientation of running a school. The expression of the training objectives is not accurate and clear, which is not conducive to the achievement of talent training objectives.
- Slogans and documents for professional certification and "new engineering" construction. Now some local colleges and universities are suffering from "red eye disease", which put forward many slogans for the professional certification of engineering education and the construction of "new engineering", and also issued a lot of "red head documents". However, these local colleges and universities are only on the inflow forms and slogans, and have no achievements in the specific implementation and improvement of teaching design [4].
- The teaching staff has been fixed for a long time and the

teaching methods have been localized. Through the visit to some local colleges and universities, it is found that there are no new teachers in the secondary colleges of many local colleges and universities for a long time. The traditional curriculum oriented teaching design has been used in the teaching method. The teaching content is old, the teaching process is full, the assessment method is single, and the professional certification of engineering education and the construction of "new engineering" are indifferent.

### III UNDERSTANDING THE CONNOTATION OF OBE AND ANALYZING THE TRADITIONAL TRAINING MODE OF MECHANISM PROFESSIONALS

#### A. Interpretation of the connotation of achievement oriented Education

In 1981, Spady first proposed the concept of results oriented education, and after nearly 10 years of development, formed a theoretical system of engineering education based on the concept of results oriented education, and became an advanced education thought leading the reform of international and domestic engineering education. The concept of results oriented education emphasizes reverse design, student-centered and continuous improvement, and highlights the peak results that students can achieve through the education process [5, 6]. Its connotation is reflected in five aspects, namely:

- Let students know what learning achievements they can achieve through the learning process.
- Let students know what the meaning of these learning achievements is.
- Let students know that the role of schools and teachers in the process of students achieving these learning outcomes.
- Let schools and teachers know what learning achievements students have achieved.
- Let the school and the teachers know that the difference between the school and the teachers in order to let the students achieve the results of the students.

Based on the connotation of the concept of results oriented education, the current professional certification of engineering education focuses on the decision of results rather than process, peak results rather than cumulative results, results rather than certificates, teacher guidance rather than teacher domination, expanding opportunities rather than limiting opportunities, emphasizing knowledge integration rather than knowledge separation, cooperative learning rather than competitive learning And inclusive success, not equal success. Compared with the traditional education, the new ideas and measures of achievement oriented education bring to our engineering education are more meaningful and far-reaching than "passing" the professional certification of engineering education.

#### B. Analysis of the traditional training mode of mechanism professionals

As mentioned before, mechanism major is the supporting basic major in various fields of national economy. The traditional training mode of mechanism major emphasizes the positive design oriented by curriculum and highlights the training orientation of mechanism major. It shows that when

students graduate through the learning process, "what can they do?" often ignores the school's training objectives and students' learning process, individual differences and graduation what are the specific capabilities [7]. This feature is mainly manifested in the following aspects:

- The talent training program cannot keep pace with the times. The formulation of professional talent training program should be student-centered, which can effectively guarantee the "what can be" of students' learning results when they graduate. However, the traditional mechanism professional talent training program is the only standard for all learning contents and graduation of students in school. Generally, it is revised once every four years, and each revision is only a minor course, adding or removing several courses. With the increasing innovation of advanced technology and equipment and advanced manufacturing concept, it is difficult for the mechanism professionals trained in this way to meet the needs of society and enterprises.
- The talent training program limits the development of students' personality. The traditional mechanism professional training program only requires three hard indexes for students to graduate, that is, length of study, course content and course performance, which is highlighted in that students can graduate smoothly as long as they have completed the course content specified in the talent training program and obtained the course performance above the pass level within the length of study, so that the professional training mode is now It seems that it is not conducive to the creative development of students, the overall development of students and the improvement of students' quality and ability.
- The talent training program is too hard for curriculum system and assessment. The traditional training plan of mechanism talents only emphasizes the contents of general education, professional compulsory courses, elective courses and practical teaching links, which limits that the student must accept the same teaching contents and the same teaching methods at the same time and in the same place. It does not reflect that everyone can succeed, nor does it highlight that all students can succeed through learning This often leads to students only considering the course results in school, and even some students are struggling for failing courses in the whole learning cycle, which is contrary to the idea of taking students as the center and taking students' peak achievement as the guide.

### IV RECONSTRUCTION OF PERSONNEL TRAINING MODE AROUND ACHIEVEMENT ORIENTED EDUCATION

#### A. OBE concept guides professional education and determines talent training objectives

Hubei Institute of technology is located in the southeast of Hubei Province, on the South Bank of the middle reaches of the Yangtze River. The local industrial culture is rich, the industrial foundation is good, and the training characteristics of mechanism specialty are based on serving the local economic construction and social development, training to adapt to the needs of new-type industrial construction, complying with the

development needs of intelligent manufacturing and intelligent transportation industry, and developing in an all-round way in virtue, intelligence, physical and beauty, with mechanical engineering and machinery Basic knowledge and application ability of mechanical design and manufacturing, computer and control engineering, capable of design and manufacturing, engineering application, technical service and other aspects of mechanical products and systems in the mechanical industry and related fields, senior application talents with innovation awareness, team cooperation and communication ability, organization and management ability, and lifelong learning awareness and ability.

China's engineering education professional certification standard is not to guide the homogenization of colleges and universities across the country, but to focus on the orientation and characteristics of the school, the national education policy, the expectations of students, elders, alumni, and the needs of industry and workplace to determine talent training objectives. Based on the concept of results oriented education, Hubei Institute of technology firmly adheres to the fundamental task of building people by virtue, adheres to the requirements of "based on the foundation and four regressions", conscientiously grasps the direction of local economic transformation and development and industrial upgrading, adjusts the orientation of running a school and the characteristics of professional development in a timely manner, and then through the visit of professional teaching and research office to enterprise units, the discussion of new parents, the return visit of graduates and the third According to the investigation of Fang's professional education institutions, the four-year talent training objectives of mechanism major are determined [8], namely:

- Training Objective 1: to train mechanical engineers with solid basic theory and professional knowledge in the field of "mechanical design, manufacturing and automation", certain innovative spirit, and ability to solve complex engineering problems in mechanical systems and related fields.
- Training objective 2: have certain organizational management ability, and be able to effectively engage in production operation management, project management, etc.
- Training objective 3: have a certain ability of team cooperation and communication, and be competent for the corresponding roles in team work.
- Training goal 4: adapt to the needs of social and economic development, have the humanities and Social Sciences literacy, engineering professional ethics, social responsibility and healthy physique, and have lifelong learning awareness and ability to continuously learn and adapt to the development of professional technology.

#### *B. The talent training plan of emphasizing reverse design and reconstructing mechanism specialty*

The concept of reverse design emphasizes students as the center and learning achievement industry as the guide. As a programmatic document for undergraduate students to study for four years, the talent training program of mechanism specialty should change the traditional curriculum oriented

revision principle, highlight the results oriented education concept, and adopt the reverse design principle to reconstruct the talent training program of mechanism specialty. The specific reconstruction measures are as follows:

- Focus on "results output" and highlight "demand". The training of professional talents is the fundamental task of colleges and universities. The orientation and characteristics of colleges and universities, the national education policy, the expectations of students, elders and alumni, as well as the needs of industry and workplace determine the training objectives, as mentioned above.
- Focus on "output of achievements", strengthen continuous improvement, and establish internal and external teaching evaluation mechanism. Based on the concept of results oriented education, the reconstruction of talent training program adopts reverse design, positive implementation, and learning results oriented, emphasizing that "demand" is both the starting point and the end point, which is inseparable from the internal and external teaching evaluation based on learning results. The internal and external teaching evaluation of mechanism specialty includes the internal and external teaching evaluation mechanisms, among which, the internal teaching evaluation mechanism includes multi-link comprehensive assessment method, pre graduation symposium, student evaluation, teacher mutual evaluation, teaching supervision evaluation and student information officer system, which are used to comprehensively understand the theoretical knowledge, knowledge structure, engineering practice ability and The external teaching evaluation mechanism includes new students' parents' discussion, graduates' return visit feedback, alumni 'return visit feedback, employers' visit feedback and third-party education evaluation institutions, which are used to test the achievement of learning achievements, as well as the continuous improvement of training objectives, graduation requirements and graduation indicators. By focusing on the internal and external teaching evaluation mechanism of "achievement output", a virtuous closed cycle of "demand", training objectives, graduation requirements, and graduation index points, curriculum system, teaching design, learning achievements, internal and external teaching evaluation and continuous improvement can be formed.

#### *C. Deepening cooperative education mechanism and innovate practical teaching system*

Hubei University of science and technology, through deepening the cooperative education mechanism, innovating the practical teaching system, determining the main responsibility of the teaching and research section of the mechanism specialty, constructs and implements the "basic practice layer, professional practice layer, engineering training layer and application innovation layer" multi-layer and multi module practical teaching system, and cultivates students' ability of knowledge learning, engineering application and integrated innovation. In the talent training program, the "quality expansion" module of the 10 credit system is set up; the practice primary school system is implemented, and the centralized practice teaching is carried out; the discipline

competition is vigorously promoted; the laboratory is encouraged and supported to be open to students; and the scientific research achievements are promoted to serve the practice teaching. The specific innovation and reform measures are as follows:

- Relying on the integration of production and education, we will strive to improve the quality of talent training. Guided by the cultivation of engineering application ability, build a cooperation platform of production, learning and research. We have carried out the pilot training of talents in the direction of refrigeration machinery with Dongbei Electromechanical Technology Co., Ltd., and carried out the personnel training reform in the direction of environmental protection equipment with Yixing engineering college. It has established a national college student internship training base, and built three in school laboratories with Huangshi Sanfeng intelligent and other enterprises. We have established 13 stable off campus practice and training bases in three ring forging, Luoyang Yituo and other well-known enterprises.
- Strengthen laboratory construction and pay attention to practical teaching. Based on this major, we have established provincial experimental teaching demonstration center and provincial virtual simulation experimental center. During the practical teaching, we have put forward the new concept of "three transformations" of practical teaching, which provides an advanced experimental practice platform for students of this major to carry out experimental activities such as course learning, experiment expansion, course design, engineering training, innovation and entrepreneurship
- Create an innovative environment and cultivate students' interest in engineering. The innovation activity base of provincial college students was established, the opening system of laboratory was established, the innovation spirit of students was stimulated, and the platform was provided for the cultivation of students' innovation consciousness and engineering creation ability. In the past three years, students have published more than 20 papers, obtained 3 invention patents and more than 20 utility model patents.

At present, it is an important period for Hubei Institute of technology to make great efforts to open a new era of undergraduate education reform and development, adhere to the professional certification standard of engineering education, and implement the fundamental task of "Building Morality and cultivating talents". In this important period, "quality is strong" is the consensus of the whole school, and gradually condenses into a joint force to pursue high quality. Based on the certification standard of engineering education major, and in accordance with the document spirit of the implementation plan for revitalizing undergraduate education of Hubei Institute of technology and the training orientation and characteristics of the major of mechanical design and manufacturing and automation, the university has established a steering committee for the construction of professional teaching quality assurance system, issued quality standards for application-oriented personnel training, and simultaneously constructed curriculum standards, classroom standards and new teaching modes Standards; actively explore the composite teaching system,

independent learning system and student service system, explore the "four networks interworking" mode of Ideological and political education, the "six in one" mode of innovation and entrepreneurship education, and the "co creation" mode of teachers and students; actively explore the education management mode, personnel training mode and method reform, etc., to grasp the quality of daily education and teaching process management; based on the student-centered, implement the "double lift" Objective, double main system, double line operation, double ring improvement, double evaluation "teaching quality assurance system.

## V CONCLUSION

After more than 40 years of accumulation, the mechanism specialty of Hubei Institute of technology has formed an open talent training system, which is guided by the output of students' achievements, characterized by the integration of production and education, strengthens the training of school enterprise cooperation talents, explores and implements the "order" talent training mode, and establishes the combination of professional education and engineering application ability training based on the concept of results oriented education. This major adheres to the professional orientation of "serving the local economy, facing the equipment manufacturing industry, and focusing on engineering practice", closely combines the national education policy, the school's school running characteristics, the social and economic development needs of Hubei Province and Huangshi City, and adheres to facing the local and grassroots level, cultivating a solid professional foundation, strong application ability, good comprehensive quality, innovative spirit and new adaptation The application-oriented engineering talents are required by the development of modern technology.

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