

Construction and Research of Process Equipment and Control Engineering Based on Industry-university-research Cooperation*

Na Xiao

School of Mechanical Engineering
Huanghe Science and Technology University
Zhengzhou, China 450000

Luoming Zhang

School of Mechanical Engineering
Huanghe Science and Technology University
Zhengzhou, China 450000

Hui Li

School of Mechanical Engineering
Huanghe Science and Technology University
Zhengzhou, China 450000

Abstract—Industry-university-research cooperation is an important way to improve students' comprehensive quality and employment competitiveness. It is a strategic measure for mutual cooperation and common development of higher education, production departments and scientific research. It is the direction of the reform and development of applied undergraduate education and one of the important ways to improve the ability of innovation. This paper mainly introduces the research on the construction of process equipment and control engineering combined with Industry-university-research cooperation through the combination of faculty construction, constructing practical teaching platform, and constructing the curriculum system of characteristic specialty construction.

Keywords—industry-university-research; combination; process equipment and control engineering; professional characteristics

I. INTRODUCTION

The specialty of process equipment and control engineering in Huanghe S & T University has the characteristics of chemical equipment design, to cultivate students' creative ability, practice ability, and ability to analyze and solve complex engineering problems. Take the ability training as the standard, the knowledge application as the foundation and the innovation ability as the goal, and improve the students' comprehensive ability and knowledge level, lay the foundation for the students' sustainable development. Cultivate students' ability to apply practical knowledge and technology to solve practical problems in production, service and management.

II. THE ROLE OF INDUSTRY-UNIVERSITY-RESEARCH COOPERATION IN THE CULTIVATION OF PROFESSIONAL TALENTS

Industry-university-research cooperation is an important way to improve students' comprehensive quality and employment competitiveness. It is a strategic measure for mutual cooperation and common development of higher education, production departments and scientific research. It is the direction of the reform and development of applied undergraduate education and one of the important ways to improve the ability of innovation. The system, mechanism, law, pattern, method and implementation of the system must be studied in order to adapt to the integration trend of mutual infiltration and integration in teaching, scientific research and production, that is, gain new knowledge in the field of scientific research, impart new knowledge in the field of teaching, apply new knowledge in the field of production, and the three are closely linked, complement each other and integrate into one [1].

The industry-university-research cooperation talent training model gives students the opportunity to access more types of professional work environments and practical projects, so that students have more opportunities to explore and develop their own careers, benefiting schools, students and enterprises. The implementation of the special specialty construction of the applied undergraduate college and the function of the joint operation of the enterprise depend on the internal coordination of both sides, but also on the supporting reforms of the system and mechanism to provide good conditions for their development. In accordance with the principles of industry associations, enterprises, and school cooperation, led by industry development, and guided by social demand, professional teaching standards are established and materialized into professional teaching content to achieve the integration of professional standards and professional

*Fund project: This paper is one of the research achievements of the 2017 teaching reform project of Huanghe S & T University, "Research on the Construction of Applied Undergraduate Specialty Based on the Industry-university-research cooperation --- Research-Taking the Process Equipment and Control Engineering as an Example" (Project No. JGYB2017021); The one of the achievements of the ninth batch of Henan province machinery manufacturing and automation key discipline construction project.

qualification standards, school assessment and social appraisal, integration of on-campus practice and off-campus posts, highlights the practicality and professionalism of the education and teaching process, and innovate the training model of Industry-university-research cooperation as the core, builds a specific combination of Industry-university-research cooperation, such as order training, work-study and post internship and other specific training mode, improve the quality of personnel training, and promote the reform, innovation and development of applied specialty education in the construction of characteristic specialties [2].

III. THE SPECIFIC MEASURES FOR THE INDUSTRY-UNIVERSITY-RESEARCH COOPERATION TO PROMOTE THE CONSTRUCTION OF PROCESS EQUIPMENT AND CONTROL ENGINEERING PROFESSIONAL CHARACTERISTICS

Through the Industry-university-research cooperation, optimize the construction of professional structure constantly and improve students' comprehensive professional level, practical ability and ability to solve practical problems [3].

A. Construction of Faculty

Implement a system of teachers' appointment that combines full-time and part-time teachers, adopt an open approach to teacher appointment, encourage first-line technical or managerial personnel of enterprises to teach practical courses in schools, send teachers to enterprises to receive various technical and qualification training, and update knowledge and teaching methods. Build a high-quality "double division" specialized and combined faculty. The Industry-university-research cooperation has put forward higher requirements for the quality of teachers. Teachers will face many new problems and challenges.

B. Construction of Practical Teaching Platform

- Taking the internship base as a professional internship window, relying on the status of teachers in the industry and their scientific research and technological development capabilities, actively carry out the Industry-university-research cooperation projects, such as the research and development of the internal cleaning robot project in the chemical complex structure equipment. The teachers lead professional students to receive professional practice standardized skills training in the school training base by actual combat projects. At the same time, they also solved the production technology problems for the enterprise.
- Make full use of the existing resources of the enterprise, for example: He'nan Qing'an High-Tech Co., Ltd. has a nationally certified enterprise technology center, with technical conditions from small test, pilot to batch production, with technical conditions from small test, pilot test to mass production, and equipped with 100 thousand tons/year phthalic anhydride and 100 thousand tons/year plasticizer production base. In December 2016, the college signed an agreement with the enterprise to establish a practical teaching base for college students.

At the end of May 2017, the first batch of production intern students conducted a two-week internship. In August 2015, the college signed an agreement with Zhengzhou Fluoride Refrigeration Equipment Co., Ltd. for the teaching practice base of college students. The students regularly go to the enterprise to carry out the field teaching by the technical personnel for equipment design, material selection and parts of the equipment.

- Establish cooperative relationships with professional-related employers through various channels and in various ways, and encourage students to obtain short-term follow-up and professional skills training in these enterprises by means of work-study during holidays and decentralized internships.
- Formulate a school-enterprise dual tutor system, allowing enterprises to participate in internship guidance, graduation design guidance, and on-the-job training. Students conduct job training while conducting project design related to enterprise production and research and development, and improve the students' ability to connect the theory with the practice and the engineering application.

C. Construction of the Constructing a Curriculum System for Characteristic Professional

- The curriculum system is "the planning method adopted by the curriculum and the structure system determined under the guidance of a certain educational ideology." The curriculum system of Industry-university-research cooperation combined with the talent training mode is guided by the education thoughts of "employment-oriented, post-based, and competency-based". After the post needs research, according to the ability required by the post, train the knowledge and skill system of the post series courses. Take the curriculum system of engineering theory and engineering practice education as the core, and build a high-skilled personnel training teaching platform with broad foundation and professional integration.
- According to the different characteristics of the process equipment and control engineering, based on the analysis of the actual activities of the enterprise and the professional ability of the post, to train the students' professional ethics, professional ability and the ability of sustainable development as the basic point, the curriculum system of knowledge system is broken and the ability oriented curriculum system is created.
- The talent training model curriculum system of Industry-university-research cooperation, the knowledge and skills selected as the content of the course should be based on the analysis of work tasks and professional ability, and the people who are most familiar with the work tasks are those enterprise experts who have been working in the in the corresponding positions and are good at rethinking.

- Based on the enterprise, build the second classroom of production practice. Students take advantage of the summer vacation to carry out social practice activities, directly participate in the production and management activities of the enterprise, build practical links, and strengthen the cultivation of quality and ability.
- Make full use of professional advantages, teachers and corporate mentors combine scientific research to provide students with graduation design topics, so that students can achieve the integration and improvement of knowledge and ability in graduation design. The implementation of the dual tutor system of schools and enterprises, corporate tutors focus on introduce the situation and needs of the rapid development of the industry, the advantages and weaknesses of the industry, the comprehensive requirements of the students on the knowledge, quality and ability of students.
- Applied undergraduate institutions and corporate alliances must benefit both parties.

- [2] Ma Yinghu. Industry-university-research cooperation to Promote the Development of Colleges and Universities [J], Journal of Ningxia Teachers College. 2008, (02): 26-28.
- [3] Liu Hong. Some Thoughts on the Industry-university-research cooperation in Colleges and Universities[J], Journal of Changchun University of Science and Technology (High Education Edition). 2008, (03): 32-35.

IV. EXPECTED RESULTS

Based on the application-oriented innovative talent training model, through teaching reform and practical activities, solve practical problems in the theoretical teaching and practice, and coordinate the curriculum teaching system, so that the students can not only get the education of the undergraduate education, but also strengthen the cultivation of the application, compound and innovative ability. Through the cultivation of innovative abilities, the comprehensive quality and ability will be enhanced, to make students become applied talents with strong engineering ability, innovation ability and social competitiveness to meet the needs of society.

V. CONCLUSION

The Industry-university-research cooperation talents training enables students to access more types of professional work environments, benefiting schools, students and enterprises. Led by industry development, and guided by social demand, professional teaching standards are established and materialized into professional teaching content to achieve the integration of professional standards and professional qualification standards, school assessment and social appraisal, integration of on-campus practice and off-campus posts, highlights the practicality and professionalism of the education and teaching process, gain new knowledge in the field of scientific research, impart new knowledge in the field of teaching, apply new knowledge in the field of production, and the three are closely linked, complement each other and integrate into the one, innovate the professional talent training mode with the Industry-university-research cooperation as the core to ensure the quality of personnel training.

REFERENCES

- [1] Wang Wei. Strengthening the Industry-university-research cooperation in Universities to Enhance the Ability of Independent Innovation [J], Journal of Anhui Vocational and Technical College. 2006, (02): 19-21.