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Construction of Practical Teaching System of Automation Specialty for Application-oriented Undergraduate

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Abstract: This paper takes the applied undergraduate automation major as the research object of the practical teaching system. Starting from the ability needs of employers for college students and the problems in the design of practical teaching system, this paper analyzes the current situation and existing problems of the cultivation of college students' practical ability. At the same time, it studies the design principles of practical teaching system and the influencing factors on the cultivation of practical teaching ability, and puts forward a practical teaching system with the cultivation of practical ability as the core, so as to provide ideas for the practical teaching reform of engineering majors of application-oriented undergraduates.

1. Introduction

According to the statistical bulletin of national education development in 2019 issued by the Ministry of education, the gross enrollment rate of higher education in China has reached 51.6%. With the rapid development of enrollment scale, the challenges faced by higher education are concentrated in two aspects: one is to improve the quality and practice the important strategic task of "Comprehensively opening up and building a powerful country in higher education" put forward by the 19th National Congress of the Communist Party of China. The second is classified development to meet the needs of economic and social development for talent diversification. There is a distinct difference between the training of applied undergraduate automation talents and the traditional research undergraduate talents[1][2]. It focuses on cultivating high-quality applied talents with strong social adaptability and competitiveness. The specialty is closely combined with local characteristics and pays attention to the cultivation of students' practical ability[3][4].

2. Problems existing in the current practical teaching system of automation specialty

First, the practical teaching system can not meet the needs of the industry[5][6]. The existing practical teaching system of applied undergraduate automation specialty is not perfect, and it has not been dynamically and timely optimized and adjusted to keep up with the needs of enterprises

and the development direction of the industry.[7][8] At the same time, the proportion of full-time teachers in the teaching staff is relatively high, the relative number of full-time experimental teachers is small, full-time teachers lack enterprise practical work experience and engineering practical ability, so it is difficult to complete high-quality practical teaching. Finally, there is a big gap between students' quality and ability and enterprises' demand for talents, resulting in the "dilemma" of enterprises' difficulty in recruiting talents and students' employment. The second is the lack of scientific management and evaluation standards[9][10]. From the perspective of students, the traditional practical teaching evaluation system takes the final result as the only evaluation reference standard, and the evaluation method is single. At the same time, the lack of corresponding evaluation standards for the quality of practical teaching and the traditional organization and management of practical teaching make it difficult to ensure the quality of practical teaching, which eventually leads to the slow progress in the implementation of differentiated, diversified and comprehensive practical ability assessment.

3. Construction principles of practical teaching system

Practical teaching system is a complex and pluralistic whole, involving society, enterprises, schools, students and other aspects. At the same time, students' needs for practical teaching are diversified. The practical teaching system needs the interaction, coordination and overall consideration of various elements in order to give full play to the effect. The construction of practical teaching system of automation specialty for application-oriented undergraduates must meet the requirements of the training objectives of application-oriented talents, reflect the essence of the training of application-oriented talents, and meet the requirements of the society for application-oriented talents. The construction of practical teaching system must follow the following three principles.

(1) Systematic principle

Practical teaching is a complex whole, which follows the systematic principle and needs the cooperation and coordination of various elements: in terms of content, the objective system, design system, resource system, management and evaluation system are inseparable; In the relationship with theoretical teaching, practical teaching and theoretical teaching are independent and support each other; In terms of function, it needs to meet the diversified needs of students and give consideration to the cultivation of students' professional ethics, team spirit and innovation and entrepreneurship[11].

(2) Principle of combining commonness with individuality

The process of Cultivating College Students' practical ability needs to be people-oriented and combine commonness and individuality. In the training process, we should adhere to the overall training objectives, not only have unified standards for the assessment and management of students, based on grasping the commonness of students, but also see the individual differences of different students, pay attention to the key training of individual students, and give full play to the advantages of each student[12].

(3) Take the cultivation of professional core competence as the guiding principle

Professional core competence refers to the professional knowledge, skills or technologies that must be possessed to hold specific professional and technical positions or engage in specific work, so as to ensure competence and performance. According to the requirements for the main practical

teaching links in the national standard for professional teaching quality, this paper analyzes the professional training scheme and the syllabus of main courses, adheres to the cultivation of technical application ability, and determines the elements and learning focus of professional core ability.

(4) Principle of school enterprise collaborative education

The remarkable characteristics of application- oriented universities are facing regional school running and serving regional economic and social development. Enterprise is the only standard to test the training quality of students. The cultivation of students' professional practice ability is inseparable from the in-depth participation of enterprises. The integration and application of internal and external resources and complementary advantages play a very important role in ensuring the quality of practical teaching. In school practical teaching can enable students to participate in professional practical activities and master the skills and operation methods involved in practice. Off campus practice teaching focuses on diversified social practice activities to cultivate students' post adaptability and social adaptability and enhance their employment competitiveness.

4. Construction of practical teaching system of automation specialty

(1) Construction of target system

The practical teaching system of Applied Undergraduate automation specialty should meet the needs of the rapid development of regional high-end intelligent manufacturing industry, and be constructed around the requirements of the cultivation of professional talents' comprehensive quality and core competence. According to the composition of quality and ability, the overall goal can be divided into the following sub goals.

Professional cognitive goals. Form the cognition of the courses, professional introduction and professional content of automation specialty; Correctly understand the purpose and significance of the first-line practice in production, construction, management and service, and establish the awareness of serving the first-line.

Professional skills objectives. Master the common technologies of regional posts and future posts of automation specialty to meet the job requirements; Be able to use one or more professional technologies to solve practical application problems in the practical environment; Develop a rigorous work style, master scientific working methods and explore new knowledge and technology.

Comprehensive application capability objectives. Be able to comprehensively master automation related professional knowledge and skills, integrate them into professional application practice, and effectively solve practical application problems; Be able to bear the pressure of scientific progress and technological competition in modern society, and have strong adaptability to the development of professional technology; Have high professional quality, such as unity and cooperation, professionalism and realism, professional ethics and safety awareness.

Innovation and entrepreneurship goals. Master creative thinking methods, have strong innovation consciousness and innovation ability, and have the ability to use professional knowledge and technology for innovation and entrepreneurship.

Comprehensive quality and ability objectives. Have strong computer application ability, foreign language expression and application ability, interpersonal communication ability, quantitative analysis and mathematical modeling ability, as well as good physical and mental quality.

(2) Construction of content system

The automation specialty meets the rapid development needs of regional high-end intelligent manufacturing industry, and constructs a practical teaching content system oriented to industrial needs around the requirements of professional talents' comprehensive quality and core competence training. Realize the "three yuan integration and unity" of the needs of regional intelligent manufacturing industry, the core competence of automation specialty and the core curriculum of automation specialty, and build a "personalized, dual channel, three combination, four levels and diversification" core competence training practice teaching system.

Personalization: make personalized practice plans according to the characteristics of each student. Students choose practice projects according to their own interests, such as competition projects, research projects, patent applications, paper publishing, various projects, etc. students have the right to choose independently and give full play to each student's advantages, specialties and subjective initiative.

Dual channel: in class channel and extracurricular channel. Break the traditional in class experimental teaching mode and incorporate various extracurricular scientific and technological practice activities into the practical teaching system, such as students' competition awards, professional certificates, patent authorization and thesis publication.

Three combinations: combination inside and outside the school, combination of production, study and research, combination inside and outside the class. In depth cooperation with professional counterpart enterprises in Dongguan, establish a practical teaching base, cooperate with schools and enterprises to guide competitions, internships and graduation designs, and cooperate with schools and enterprises to carry out project research to solve practical problems of enterprises. Both student practice projects and teacher scientific research projects come from the actual production of regional enterprises and society.

Four levels: from simple to complex, from cognition to innovation, practical teaching is divided into four levels: public and professional basic practice, professional curriculum practice, professional direction curriculum practice and school enterprise collaborative innovation series practice. The practical training at each level focuses on cultivating students' innovative design ability of automatic products and programming and debugging ability of automatic equipment. The public and professional basic practice levels are mainly for first-year students to carry out practical teaching such as electrical and electronic technology training and mathematical modeling competition; The practice level of professional courses is oriented to grade one and grade two students. Students complete the design practice decomposed from integrated projects in the form of curriculum design and special practice; The practice level of professional direction courses is oriented to second and third grade students. Students complete comprehensive practice decomposed from integrated projects, mainly including professional competitions, professional textual research, patent applications, thesis publication, etc; The practice level of school enterprise collaborative innovation series is for grade 3 and grade 4 students, mainly including graduation practice, graduation design, industry university research projects, "3+1" enterprise practice, comprehensive professional competition, etc.

Diversification: adopt learning centered and diversified teaching methods and means, promote "learning by doing" teaching methods such as CDIO Engineering Education, OBE achievement orientation and PBL project teaching, and make full use of modern educational technology to

realize online and offline mixed teaching, in class and in class extension teaching, and in school and out of school interactive teaching, Promote the cultivation of industry-oriented core competence.

5. Conclusion

Based on a large number of literature research, aiming at the problems existing in the current practical teaching system of application-oriented undergraduate automation specialty, including the fact that the practical teaching system can not meet the industrial needs and the lack of scientific management and evaluation standards, this paper analyzes the construction principles of the practical teaching system, puts forward the practical teaching system of applied undergraduate automation specialty facing the needs of industry. The practical teaching system constructed in this paper is to explore the training path of applied talents and improve students' engineering practice ability. It provides a reference idea for practical teaching reform, such as highlighting the cultivation of professional core competence and enhancing students' employment competitiveness.

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