Exploration on new teaching reform mode of mechatronics specialty in technical colleges

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Abstract: In the process of the reform of modern vocational education, the cooperation between school and enterprise and the integration of industry and education have become an important trend of the reform and development of vocational colleges. In the teaching reform of mechatronics specialty, technical colleges should deeply analyze the problems faced in the current teaching, and promote the docking of teaching content and enterprise posts on the basis of school-enterprise cooperation; Take the integration of production and education as the window to change the teaching methods and means; To improve the quality of education and teaching by means of teacher construction; In the direction of diversified development, promote the integration of post, course and certificate, thus creating an efficient, scientific and systematic mechanical and electrical integration professional teaching mode for students, and providing important help for students' employment development.

Key words: Technical colleges; Mechatronics major; Teaching reform

In the social situation of the rapid development of modern science and technology, the requirements of enterprises for technical and applied talents are constantly improving. Students are not only required to have a solid cultural foundation and theoretical level, but also need to show outstanding practical skills and innovative thinking. Therefore, technical colleges need to promote the teaching reform of mechatronics major, optimize the course content, teaching methods and teachers in all aspects, and build a teaching model and curriculum system that meets the current needs of enterprises.

I. Problems faced by mechatronics teaching in technical colleges

Mechatronics is one of the engineering majors, which focuses on learning a variety of advanced technologies, showing strong comprehensiveness and practicality. With the rapid development of the mechanical and electrical industry, the problems in the teaching of mechanical and electrical integration in technical colleges are becoming more and more obvious.

1. The course content is out of line with the job

In the process of China's development from a manufacturing country to a manufacturing power, the equipment manufacturing industry has developed rapidly. The field of mechatronics industry is in the process of comprehensive upgrading, and the comprehensive upgrading of new technologies, new processes and new norms has been realized. However, in mechatronics major of technical colleges, the course content has not been improved and optimized in time. On the one hand, the course content has not been adjusted in time through the review and supervision of enterprise experts in the cooperation between schools and enterprises, and on the other hand, the school-based course has not been built according to the teaching needs, resulting in the disconnection between the current course content learned by students and the work skills required for enterprise posts.

2. The inefficiency of school-enterprise cooperation and the integration of industry and education

With the full implementation of the Action Plan for Enhancing the Integration of Production and Education in Vocational Education (2023-2025), school-enterprise cooperation and integration of industry and education have become an important development trend in the teaching reform of vocational colleges. For mechatronics majors in technical colleges, some schools have also opened a variety of cooperation methods and integration models, such as modern apprenticeship, on-the-job internship, master studio, order-type training, etc., in order to strengthen the relevance of professional construction with the development of enterprises and industries, and provide students with more practical learning platforms and ways. But at present, in general, the effect of school-enterprise cooperation and industry-education integration is not good, and it is still at the surface level of cooperation, which is mainly manifested in the following aspects: first, the lack of a complete and systematic management mechanism for school-enterprise cooperation; Second, the lack of clear and win-win cooperation goals, the investment and benefits of both sides of the school and enterprise are unbalanced; Third, there is no institutional guarantee for school-enterprise cooperation. When there are cooperation conflicts or other problems, there is no management basis to restrain both parties and provide guarantee. Therefore, the current school-enterprise cooperation and the implementation of the integration of industry and education are in the dilemma of insufficient cooperation and disconnection between industry and education.

3. Lack of teachers' ability and practice level

The technical regulations for the development of the National Curriculum Standards for the Training of Skilled Personnel for the Integration of Engineering and Technology clearly stipulate the ability and quality and the corresponding work experience for teachers in the integration of engineering and technology. Teachers are required to have both theoretical and practical teaching ability, and work experience in professional related industries to understand the needs and changes of industry and industry development. However, at present, most teachers in technical colleges and universities cannot meet the standard of integrated teachers. On the one hand, most teachers have outstanding theoretical teaching level, but their practical teaching level is relatively poor due to the lack of rich and in-depth working experience. On the other hand, the current technical colleges have shortcomings in the integration of teacher training, such as

teachers' practice time in the enterprise is relatively short, and most of the work is relatively simple and common, unable to understand the latest technology, technology and concept in the industry field. On the other hand, enterprises themselves also have a high sense of self-protection, especially for the new technology, key technology and other core content, do not allow the practice of communication teachers to understand, which makes the integration of engineering teacher training effect is not good.

II. Optimization path of mechatronics teaching model in technical colleges

In view of the current practical problems in the teaching of mechatronics, technical colleges should promote the construction of school-enterprise dual-subject collaborative education system, so as to implement the reform measures such as the comprehensive development of course content, teaching methods, teachers and post course competition certificates.

1. Deepening school-enterprise cooperation and reconstructing curriculum content

For technical colleges, the direct goal of school-enterprise cooperation is to train students who meet the needs of enterprises, perfectly connect school education with enterprise positions, and enable students to have good job competency and employment competitiveness when they graduate. In this regard, it is necessary to integrate the knowledge, skills, norms, corporate culture and professional standards currently applied in enterprise positions into the course content, so as to ensure that the course content is job-oriented. Schools should establish a collaborative education mechanism with enterprises, and enterprise experts should conduct a comprehensive review of mechatronics courses. First, we should adjust personnel training programs and curriculum standards from the macro level, improve the traditional teaching system, and integrate them into the industry certification standards; Second, we should integrate enterprise practice cases into the curriculum, establish a case resource base that is applicable, practical and targeted, and take enterprise typical work projects as teaching carriers to promote project-based teaching practice. Thirdly, the enterprise culture should be integrated into the curriculum ideological and political construction, and students should be guided to establish spiritual qualities such as craftsman spirit, innovation consciousness, dedication spirit and labor spirit.

Take the course "Automatic Production Line Debugging and Maintenance" as an example. First of all, according to the course standards, before the course content is determined, technical colleges should send teachers to discuss and investigate with experts from cooperative enterprises, and judge the knowledge, ability and quality objectives that need to be achieved in the teaching of this course through the vocational skills required by the enterprise's job groups. At the same time, the specific analysis of the typical tasks of different posts, determine the relevant teaching content system of this course, and design a complete and systematic teaching project. Secondly, teachers in technical colleges and universities should communicate with enterprises and apply for relevant materials according to the teaching materials required for this course, including engineering drawings, videos related to project operation, and cases of technological innovation projects of enterprises. The teacher should optimize and integrate the resources provided by the enterprise, and take them as the basis for typical cases, production situations, project activities and other resources in the course teaching. In addition, teachers should form a good contact channel with the relevant personnel of the enterprise, and regularly carry out online discussions or offline research and communication. Especially when enterprise technology and process innovation or industry rules and social environment change greatly, through communication between the two sides, the content that needs to be supplemented will be added to the curriculum system in a timely manner, and the backward and disconnected content will be deleted, so as to ensure the advanced nature and cohesion of the course content, so that students can achieve the effect of matching positions in employment.

2. Emphasize the integration of production and education and optimize teaching methods

In the process of the integration of production and education, technical colleges also need to promote the reform and optimization of talent training mode from the level of teaching methods. Teaching methods not only affect students' learning attitude and quality, but also have a direct impact on students' ability growth and skill development. In the major of mechatronics, because of the high practical and comprehensive requirements of the course, teachers need to comprehensively promote the implementation of "guided" education. "Guided" education is not a fixed teaching method, but refers to a kind of teaching method. It mainly uses various teaching resources or carriers to guide students to complete thinking, guessing, discussion, cooperation, practice, verification and other activities independently, so as to achieve the purpose of improving students' practical literacy and innovative thinking.

Specifically, teachers can guide students with the help of questions, discussions, situations, projects, tasks and other contents, while adopting the teaching idea of group cooperation. First of all, the number of the group should be controlled to 6-8 people, adopt the principle of heterogeneous grouping, to ensure that the strength of each group is balanced, and the group has different abilities, personalities and talents of students. Group members can take turns to be the group leader, and responsible for the discussion, division of labor, management and other contents of the group. Secondly, in teaching practice, teachers assign learning tasks to student groups with the help of problems, situations, projects and other carriers, and student groups need to formulate corresponding task completion plans and implementation plans through discussion. At the same time, the student group is divided into labor, and each member carries out practical learning according to the division of labor and task plan, including consulting materials, analyzing problems, discussing solutions, program practice and optimization, etc. In this kind of teaching design, the teacher participates in the whole process as a guide, and the students mainly complete the learning tasks and practical projects independently, thus improving the students' teamwork accomplishment and problem-solving ability.

3. Strengthen the teaching staff and expand the teaching staff

Teachers are the core subjects in the implementation of teaching activities, and therefore the key factors affecting the effectiveness of teaching. In the process of promoting the teaching reform of mechatronics specialty, technical colleges also need to strengthen the training of

teachers, so as to provide students with high-quality education services.

First of all, technical colleges should establish a mechanism of mutual recruitment of talents with enterprises, invite enterprise experts and industry experts to enter the school, and set up a team of teachers integrating production, study and research. Enterprise experts can regularly carry out special courses or lectures to tell teachers and students about the current requirements for mechatronics professionals, work content, new process technology and post specifications. At the same time, enterprise experts can also serve as practical teaching tutors in the school, and promote the systematic construction of practical training activities in the school by optimizing practical course content, project activities and teaching programs. Secondly, technical colleges should also send teachers to the enterprises for exchange and learning. On the one hand, we should mainly investigate and understand the working environment of the enterprise, the development trend of the industry, the characteristics of the enterprise culture, the standards of talent demand, and the indicators of job skills. On the other hand, we should focus on practice and study, directly participate in the specific posts, try to complete the corresponding work content, and specifically understand the working process, working methods and quality standards of different posts. Third, technical colleges can also establish a sound teacher training system. First, regular special training courses should be established, aiming at the ability and accomplishment of teachers in various aspects such as education concept, teaching method, teacher ethics and information teaching. Second, a teacher development plan should be established to encourage teachers to upgrade their academic qualifications, obtain certificates of skill levels, and participate in various teaching competitions and research activities, so as to promote the sustainable development of teachers' abilities and qualities in all aspects. Third, we should establish enterprise standard training rooms for teachers to improve their practical skills and comprehensive literacy.

4. Adhere to diversified development and integrate posts, courses and certificates

Under the current vocational education system, "post class competition certificate creation" is an important reform activity that teachers must pay attention to. In the optimization construction of mechanical and electrical integration teaching mode, technical colleges should also strengthen the integration construction of post course competition and certificate, so as to promote the diversified development of students.

First of all, the content of post work, skills competition projects, certificate examination questions, and double innovation competition projects should be integrated into the existing curriculum system. While emphasizing the connection between courses and positions, students' skill competition level, certificate acquisition ability and innovation and entrepreneurship literacy should be improved. Secondly, students should be actively guided to participate in activities such as "skills competition", "skill certificate acquisition" and "double innovation competition". On the one hand, schools should regularly carry out activities such as vocational skills competition and innovation and entrepreneurship competition to provide students with multiple practical learning platforms; On the other hand, it is necessary to encourage students to participate in the acquisition of skills certificates, further improve students' employment competitiveness, and promote the implementation and development of the "1+x" certificate system.

III. Conclusion

To sum up, in the process of modern vocational education reform, mechatronics major in technical colleges is faced with such problems as disconnection of course content, lack of school-enterprise cooperation experience, and need to improve teachers' ability level. In this regard, strategies and methods such as deepening school-enterprise cooperation, emphasizing the integration of production and education, strengthening teachers, and insisting on diversified development should be adopted to promote the optimization and development of the course content, teaching methods and teachers of this major, and then build a scientific and efficient teaching model and talent training system of mechatronics that integrates posts, courses, and certificates, so as to lay a solid foundation for the employment development of students of this major.

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