

Research on teaching reform of Higher Vocational machinery manufacturing major under modern manufacturing

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Abstract: with the proposal of the “made in China 2025” strategy, the pace of transformation and upgrading of the national manufacturing industry continues to be rapid, and the industry has strengthened the demand for machinery manufacturing talents. This market situation has brought new opportunities and challenges to the teaching of machinery manufacturing major in higher vocational colleges. Modern manufacturing has led the transformation and upgrading of the manufacturing industry. As a place to deliver innovative and compound mechanical talents to the society, higher vocational colleges should pay attention to actively adjusting teaching according to the development of the times, building a new teaching mode, innovating teaching methods of professional courses, improving the curriculum system of Mechanical manufacturing, cultivating students’ high-quality professionalism and promoting students’ all-round development. Based on this, this paper analyzes the teaching reform strategy of Higher Vocational machinery manufacturing major under the background of modern manufacturing, in order to provide reference for educators.

Key words: modern manufacturing; Higher vocational education; Major in mechanical manufacturing; Teaching reform

Introduction: in “made in China 2025”, it is clearly stated that “the main line is to accelerate the deep integration of new generation information technology and manufacturing industry, and the main direction is to promote intelligent manufacturing”. In the context of modern manufacturing, the speed of technology upgrading in the machinery manufacturing industry has accelerated, providing key technical support for the technical equipment and devices required by various industries. Machinery manufacturing enterprises need compound and innovative professionals. In this regard, higher vocational colleges should adjust the teaching plan according to the requirements of the industry, integrate cutting-edge technology and advanced teaching concepts into the teaching, use micro class, hybrid teaching and other methods to carry out teaching, improve students’ professional skills such as mechanical drawing, and exercise students’ comprehensive ability.

1. Characteristics and key trends of modern manufacturing

1.1 Characteristics of modern manufacturing

Modern intelligent manufacturing technology is a cutting-edge industrial technology to promote the transformation and upgrading of the industrial system, which is conducive to improving the scientific research level of China’s complex products. The workflow of manufacturing industry includes product planning, product design, batch production and other links. The introduction of modern technology can effectively improve the efficiency of manufacturing production and help the development of manufacturing industry. Modern manufacturing endows the traditional manufacturing with intelligent characteristics, prompting the traditional manual link to be gradually set with computer intelligent link, so as to promote the intelligent development of manufacturing production, effectively solve the complex management problems in traditional manufacturing work, promote the innovation of decision-making mode and production mode of manufacturing enterprises, and promote technological innovation through the application of Internet of things, cloud computing and other technologies, Promote business model innovation by providing intelligent products and services, and promote production model innovation by building intelligent equipment and workshops.

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1.2 Key trends in modern manufacturing

Modern manufacturing is the product of the deep integration of modern cutting-edge technology and manufacturing technology, that is, the integration of artificial intelligence technology, cloud computing technology and industrial production system. The proposal of this concept promotes the development of traditional manufacturing industry in the direction of modernization and intelligence. The development and application of modern technology provide great convenience for the development of manufacturing industry, and promote the transformation of manufacturing industry from labor-intensive to knowledge information and talent intensive. The development of modern manufacturing promotes the development of productivity, and promotes the modern manufacturing mode to show phased characteristics such as mass standard production and mass customization. In the future, the development direction will show full life cycle management, and promote the manufacturing industry to be more networked and intelligent.

1.3 Demand of enterprises for modern machinery manufacturing talents

Talent is the key to promote the development of machinery manufacturing industry. Under the background of modern manufacturing, mechanical manufacturing enterprises urgently need interdisciplinary talents of digital intelligent production integrating design and development, production and manufacturing, operation and management and service. This current situation of talent demand has prompted higher vocational colleges to gradually move towards a diversified and compound direction in talent training. The first is digital design talents. Digital design is an important standard for the modernization of mechanical manufacturing. Relevant employees need to have the skills to skillfully operate CAD, cam and other software, master simulation analysis methods, etc., to meet the new requirements of the industry for talents. The second is industrial big data analysis talents. Industrial big data provides new theoretical methods and technical applications for modern manufacturing industry, and promotes the intellectualization of fault diagnosis, material planning and other links of mechanical manufacturing production. In the face of this requirement, higher vocational colleges should pay attention to the adjustment of teaching content, not only to cultivate students' knowledge of production technology, but also to promote students' ability to carry out information analysis and optimize the production process with the help of equipment, so as to provide effective support for modern manufacturing industry. Thirdly, lean production management talents. Under the background of modern manufacturing, enterprises mainly adopt lean production management mode, apply advanced technology to realize the transparency of management process, further optimize the production process and management process, promote the improvement of enterprise management level, and achieve healthy development. Finally, compound skilled talents. In the new era, all kinds of cutting-edge technologies have realized the deep integration with the manufacturing industry, which has promoted the machinery manufacturing industry to show the characteristics of interdisciplinary. At the same time, it also puts forward compound requirements for relevant talents, requiring the machinery manufacturing related talents to develop in the direction of one transformation, multi-disciplinary and multi-disciplinary.

2. Teaching status of mechanical manufacturing specialty in Higher Vocational Colleges under modern manufacturing

2.1 Insufficient implementation of innovation education

The practice of mechanical manufacturing specialty is strong. Under the traditional teaching mode, teachers pay too much attention to the teaching of mechanical drawing, CNC machine tool equipment chiseling and other skills, pay attention to the cultivation of students' professional knowledge and skills, but ignore the cultivation of students' innovative consciousness, which makes students ignore the learning of innovative skills, which is not conducive to students' future career development. Modern manufacturing industry not only pays attention to the professional skill base of talents, but also pays attention to the innovative consciousness and ability of talents. If there is no curriculum innovation education, it is difficult to stimulate students' innovative thinking, affect the penetration of innovation education in higher vocational curriculum teaching, and is not conducive to the development of students' ability.

2.2 Teaching methods need to be innovated

Under the traditional teaching mode, the theoretical teaching and practical teaching of mechanical manufacturing specialty are not closely linked. It is often taken to explain the relevant theoretical knowledge such as mechanical drawing and NC machine code first, and then lead the students to carry out practical training after the explanation, which makes the theory and practical training separate from each other, which is not conducive to the students' understanding of the course. In the actual teaching, teachers lack the development of new technologies and new ideas, industrial robots, the Internet of things and other industry cutting-edge technologies are not fully integrated, and the teaching methods are relatively backward, which makes it difficult for students to understand the new trends of the industry in time, which is not conducive to students' adaptation to the development of the industry in the future.

2.3 Teaching objectives to be updated

Under the background of modern manufacturing, higher vocational colleges should strengthen the cooperation with professional related enterprises, and promote the cooperation of professional co construction and curriculum joint development. However, at present, there are some problems in the teaching of machinery manufacturing major in higher vocational colleges, such as the unclear employment demand of the industry, and the lack of timely changes in the talent training objectives, which makes the talent training objectives and training content relatively backward, which is not conducive to the improvement of talent training quality. In school teaching, the pace of talent training lags behind the development of industrial core technology, and the training equipment is not updated in time. This is the dislocation and disconnection between talent training in Higher Vocational Colleges and market development demand, which makes students intelligently engage in simple physical or brain rational work after graduation, and it is difficult to promote the transformation and upgrading of

enterprises.

3. Teaching reform strategy of mechanical manufacturing major in Higher Vocational Colleges under modern manufacturing

3.1 Improve the teaching system of professional courses and integrate the innovation education of mechanical manufacturing

The teaching of machinery manufacturing specialty should implement the student-centered teaching concept, reasonably set up the professional curriculum system according to the development needs of students, and promote the development of students' innovation ability. First, promote the optimization of theoretical teaching. Theoretical teaching is an important way to strengthen the theoretical basis of students' mechanical manufacturing. Teachers should pay attention to breaking the traditional teaching restrictions, optimizing teaching methods, introducing new technologies and concepts in the industry, and preparing for the follow-up practical teaching. Secondly, adjust the proportion of practical teaching. The mechanical manufacturing specialty has practical characteristics, which requires teachers to reasonably adjust the proportion of practical teaching according to the professional characteristics and the current situation of modern manufacturing development, effectively improve the practical teaching system, and promote students' innovative ability and professionalism while mastering solid mechanical manufacturing professional skills. The process of practical teaching itself is the process of students' exploration of operating skills. Teachers should provide students with rich training space, promote students' independent research in related fields, and promote the development of students' multiple abilities. Thirdly, understand the students' phased development. Teachers should fully understand the current situation of students' development, and reasonably plan teaching according to students' phased development, so as to enrich students' learning experience and promote students' good self-development. Finally, teachers should strengthen the research on industry frontier theories and technologies. The machinery manufacturing industry is developing rapidly. Teachers should pay more attention to the development of the industry, deeply study the cutting-edge theories and technologies of the industry, and introduce new technologies and new processes into teaching, so as to make teaching activities more novel and targeted.

3.2 Build a new teaching mode and build a teaching and training platform jointly by colleges and enterprises

Mechanical manufacturing professional knowledge is practical and comprehensive. In order to improve students' professional competitiveness, teachers should pay attention to the construction of a new teaching mode and build a teaching practice platform through the path of school enterprise cooperation. First, schools and enterprises should jointly build a teaching and training platform. The training platform is an important way to promote the integration of production and education and help students' practical skills development. It can provide students with a teaching environment highly close to the actual industry and enable students to contact the cutting-edge information of modern manufacturing. In this regard, higher vocational colleges should build innovative training platforms, optimize the setting of innovative training projects, and provide students with independent participation in product design, manufacturing, technical operation and other links, so as to effectively train students' problem-solving ability and engineering ability. In this process, the school should organize teachers to deeply understand the development needs of enterprises, promote the effective connection between teaching content and the current situation of the industry, guide students to participate in mechanical manufacturing related skills competition, and build a teaching mode of promoting learning through competition. Secondly, set up the internet teaching mode. Teachers of machinery manufacturing major should pay attention to introducing rain class and cloud class software into teaching, and build a new mode of online and offline teaching. Taking the teaching of mechanical drawing as an example, the teacher recorded the micro lecture video according to the characteristics of the course, recorded the operation process of mechanical CAD software, introduced the drawing process of bearings and other components, uploaded them to the online platform, and guided students to carry out autonomous learning and autonomous practice. In teaching, teachers introduce industry-leading content, guide students to analyze industrial robots, automation technology and other content, and promote the effective extension of course teaching. In the after-school practice, teachers set up mechanical drawing, industrial robots and other related test questions for students, so as to summarize students' learning problems, help students adjust their learning plans, and improve students' innovation ability.

3.3 Set up the evaluation system of modern manufacturing talents to promote the development of students' ability

The talent evaluation system based on the development status of modern manufacturing industry can not only provide guidance for students' ability development, but also enable students to correctly recognize their own shortcomings and promote the development of students' comprehensive ability. In this regard, higher vocational colleges, industry enterprises and industry associations have established cooperation to jointly participate in the quality evaluation of talent cultivation, so as to strengthen the cultivation of modern manufacturing talents. First, enhance the influence of talent evaluation. In the process of setting up the evaluation system, the school can invite relevant professional talents and industry experts from enterprises to participate in the process, introduce the professional skill level standards and enterprise employment standards, effectively integrate the enterprise talent evaluation experience, and enhance the influence of the evaluation system. Secondly, set up teaching evaluation standards. In order to ensure the effective connection between talent cultivation and industrial demand, the school should pay attention to the introduction of recognized evaluation standards and methods through cooperation with enterprises and industry associations, so as to make teaching evaluation more standard and scientific. Finally, the evaluation content is refined according to the job requirements. The school should strengthen the understanding of the posts related to the machinery manufacturing industry, conduct a comprehensive investigation on the emerging technology direction and core post content of the machinery manufacturing industry, so as to refine the teaching evaluation content and guide the improvement of the teaching evaluation content. In this process, the school should pay attention to the dynamic adjustment of the evaluation content to adapt to the changes of the times, so as

to promote the talent evaluation to effectively adapt to the changes in the job demand of the industry and help the development of students' comprehensive ability.

Concluding remarks

To sum up, high-quality technical and skilled machinery manufacturing talents are the key force to promote China's transformation from manufacturing to manufacturing power. Under the background of modern manufacturing, higher vocational colleges should strengthen the understanding of the development status of the industry, effectively improve the curriculum teaching system, improve the quality of professional and technical personnel training, promote students' timely understanding of the development status and future trends of the machinery manufacturing industry, form a correct understanding of future positions, and adopt effective teaching reform, Cultivate students into compound talents who meet the needs of social development and provide more help for the development of the industry.

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