

# Exploration on Educational Reform of Electrical Engineering and Automation Professional

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**Keywords:** Made in China 2025, Electrical engineering, Automation, Talent training; Educational reform.

**Abstract:** The core content of made in China 2025 is intelligent manufacturing, which is the result of highly integrating informatization, networking and automation. Deepening the integration of industrialization and informatization puts forward new requirements for the cultivation of electrical engineering and automation professionals. Colleges and universities are facing new challenges in the cultivation of electrical engineering and automation professionals. They need to cultivate interdisciplinary and compound talents with craftsman spirit application and craftsman spirit application. This paper analyses the development opportunities of training and education for electrical engineering and automation professionals, and puts forward some educational reform strategies, such as creating innovative curriculum system, creating online education platform, deepening electrical engineering and automation practice teaching, in order to provide professional practice talents guarantee for manufacturing 2025 in China.

## 1. Research background

### 1.1 Literature review

The made in China 2025 strategy is of great guiding significance to the modern education of colleges and universities and the cultivation of Chinese technical talents. It points out that China has entered the ranks of manufacturing powers to enhance industrial competitiveness and overall national strength. Wu Xiru believed that colleges and universities were the bases for cultivating high-quality talents. This paper analyses the present situation of modern higher education, and puts forward some effective suggestions for improving the cultivation mode of electrical engineering and automation talents (Wu, 2016). Under the background of Made-in-China 2025 strategy, Zhang Tuo and Li Dandan put forward that automation specialty need to develop and research new theory and technology, and should create a new production mode of human-technology interaction and create a virtual environment. In terms of professional education curriculum, universities carry out reforms from the perspectives of strengthening the construction of teachers, innovating teaching content and promoting curriculum construction (Zhang and Li, 2016). Liu Guitao and others analyzed the mechanism of school-enterprise cooperation in talent cultivation. On this basis, they put forward an integrated teaching talent cultivation model, analyzed the problems existing in the talent cultivation model of higher education, and put forward innovative plans (Liu et al, 2017). Xiao Zhaowu and Zhao Jinsong learned from the principle of voltage stabilizer in electrical engineering, created an optimization model for manufacturing talents cultivation, and used the same teaching concept to meet the diversified demand for talents in the market (Xiao and Zhao, 2017). Xu Peng et al took automation major of Chongqing University of science and technology as an example, analyzed the development of the industry and the current situation of professional teaching, and proposed to carry out innovation in terms of teaching form, teaching content and curriculum construction (Xu et al, 2017).

### 1.2 Purpose of research

Made-in-China 2025 points out that one of the main bodies of the national economy is manufacturing industry. This strategy is the foundation of a powerful country, the instrument of

rejuvenating the country and the foundation of a nation. Compared with the world's advanced level, China's manufacturing industry lags far behind in resource utilization efficiency, industrial structure level, quality benefit, informatization level and independent innovation ability. The task of striding across development and transformation and upgrading is arduous and urgent. Colleges and universities shoulder the responsibility of supplying electrical engineering and automation professionals for national economic development. It is the mission and responsibility conferred by the times to cultivate high-quality compound talents that meet the requirements of the times. The teaching of electrical engineering and Automation Specialty in Colleges and universities should adjust the teaching objectives and contents in time to guarantee the realization of the strategic goal of "Made in China 2025".

## **2. Opportunities for the development of professional personnel training and education**

The theory of electrical engineering and its automation specialty involves many disciplines. It has advanced methods and theories and plays an active role in promoting the third industrial revolution. Colleges and universities have established electrical engineering and automation specialty for more than fifty years. They always carry out education and teaching around the basic theory of electrical engineering and automation and integrate the advanced technology of related industrial objects (Xing and Dong, 2018). Under the new industrial revolution and the environment of China's manufacturing 2025, colleges and universities will face many new theories, objects and methods in the training and education of electrical engineering and automation professionals, and at the same time bring new opportunities for the development of teaching reform. When studying the automation theory of complex electrical engineering network system, intelligent manufacturing is no longer designed and manufactured for a certain link, but for the whole process of production process. To strengthen the combination of industrialization and information technology, electrical engineering and its automation are becoming more and more complex, which leads to new requirements for the reform of talent training and education in Colleges and universities.

Resource virtualization design and cloud computing sharing platform combine traditional manufacturing technology with Internet technology to complete deep information integration and accelerate product design and development process. Through the cloud computing platform to create a virtual design environment, enterprises to achieve equipment and data connectivity, to promote the process of work automation. Electrical engineering and automation specialty are developing simulation technology to form a new mode of production interaction. Online simulation technology has a design system that can directly act on the controlled object. Because the controlled object directly participates in the inspection process, it can timely evaluate the effectiveness of the designed system and greatly reduce the development cycle of the system. At present, online simulation technology is only applied to single link control system. Combining network technology and big data, online rapid simulation is bound to be realized. These new theories and methods in manufacturing industry are of great significance to the cultivation of electrical engineering and automation professionals in Colleges and universities. Colleges and universities need to adapt to the requirements of the market for talents in the cultivation of manufacturing talents. According to the actual development of the manufacturing industry, the talent cultivation plan shall be formulated, and the popularization and education of basic knowledge and skills of manufacturing industry shall be carried out for relevant personnel.

## **3. Under the background of made in china 2025, new challenges to talent cultivation**

### **3.1 The challenge of training talents with the ability of intelligent technology application**

Made-in-China 2025 places innovation at a key position in the growth of electrical engineering and its automation industry. Intelligent technology can solve uncertain and complicated problems, and also can quickly deal with large and complex processes. For example, the artificial neural network is used to establish a complex system model with multiple inputs and outputs, and the

expert system is used to identify the fault and state of the system. When workers master intelligent technology, they can analyze production data and process production information. The application of this ability in electrical engineering and its automation can comprehensively improve the efficiency and intelligence level of work. In the fields of electrical engineering and automation, UAV technology, industrial intelligent robots, Aerospace controller technology, artificial intelligence technology, intelligent control and detection technology, high-quality talents of intelligent technology application are needed. Only with more and more high-quality talents who master the application ability of intelligent technology, can we reverse the bad situation of lack of innovation in China's current manufacturing industry, which is a great challenge for talent cultivation.

### **3.2 The challenge of training interdisciplinary talents**

In the environment of deep integration of industrialization and informationization, electrical engineering and its automation will become the leading category of comprehensive disciplines, and promote the infiltration and integration of disciplines more widely. The talents needed for future industrial development are those with solid professional skills and knowledge in related fields. Compound talents will be the first choice for the demand of talents in the industry. The knowledge of manufacturing related disciplines covers robotics, intelligent detection, artificial intelligence, information processing and manufacturing processes. Colleges and universities should actively seek ways and means to train and educate multi-disciplinary and interdisciplinary talents, and promote the teaching reform and innovation of electrical engineering and automation specialty. In view of the cultivation mode of interdisciplinary and compound talents, colleges and universities can establish a teaching system with engineering, information, electrical engineering and automation as the core, which is conducive to adapt to the direction of social progress in the new economic form.

### **3.3 The challenge of training practical talents with craftsman spirit**

After long-term industry development and technological reform and innovation, China's electrical engineering and automation industry has a certain degree of innovation strength. Compared with developed countries, China's innovation capability is still immature, and we need to learn from the core technologies of other countries. In terms of production and manufacturing, production enterprises need to purchase and use a large number of foreign spare parts. Manufacturing high-end products requires technical talents with professional system knowledge. These talents also need to have the ability to apply knowledge to practical work, as well as rich practical experience. From the theoretical point of view, this kind of talent has the spirit of craftsmen. It not only has systematic professional knowledge, practical experience and application ability, but also has the ability to design and develop new technologies and theories by using theory, which directly promotes industrial innovation and development. In the process of realizing Made-in-China 2025, applied talents with craftsmanship spirit are urgently needed in many fields related to electrical engineering and automation. The key to the development of the industry lies in the cultivation of applied talents.

## **4. Exploration and analysis on the educational reform of training electrical engineering and automation professionals**

### **4.1 Create an innovative curriculum system**

The construction of curriculum system is the basic guarantee to improve the effect of personnel training. Many new technologies have been proposed in Made-in-China 2025, such as building intelligent factories, increasing the application of equipment and technology in manufacturing, such as industrial robots, human-computer intelligent interaction, add-on manufacturing and intelligent logistics management. In order to realize intelligent automation technology in manufacturing market, universities need to add virtual reality technology, intelligent perception technology, Internet of Things technology, system integration technology and system engineering technology to

their teaching content. In the discipline structure, universities should broaden the coverage of disciplines, break the gap between the original intelligent disciplines and automation chemistry disciplines, electronic information technology and science, computer technology and science, and create a multi-disciplinary and interdisciplinary curriculum system for professional talent cultivation. Among the types of courses, compulsory courses in Colleges and universities should be refined and few in number to ensure that students can master the most solid basic knowledge. Elective courses should be flexible and innovative, and adequately enrich the number of courses and the knowledge involved, allowing students to learn relevant courses across schools, majors and disciplines. Finally, colleges and universities form an innovative and advanced curriculum system.

#### **4.2 Create online education platform**

Utilizing the market advanced network course learning platform, the online open course in Colleges and universities is constructed. Currently, the major courses of electrical engineering and automation are Computer Control Technology, Automatic Control Principle, Microcomputer Principle and Interface Technology, etc. Students are regarded as the main body of learning, teaching resources are shared, and lifelong learning platform for the whole people is created. Colleges and universities share curriculum video resources, teaching content and curriculum testing resources on the platform, promote the transformation of traditional teaching concepts, innovate teaching mode and update teaching content. Online education platform changes the evaluation mechanism of university curriculum and improves the quality of professional training. Creating high-quality online courses promotes the sharing and integration of teaching resources, and colleges and universities form more high-quality teaching content. This way enables students to learn without being limited by time and space, and effectively improve learning efficiency. Online education platform is not only open to students, but also provides opportunities for learners to learn professional knowledge and broaden their knowledge.

#### **4.3 Deepen the practice teaching of electrical engineering and its automation**

At present, most of the teachers majoring in electrical engineering and automation in Colleges and universities do not have practical experience in their work, and they directly enter the universities to continue their scientific research work after graduation. However, with the development of electrical engineering and automation industry, it is necessary to cultivate students' practical and applied abilities. Colleges and universities should arrange professional teachers of electrical engineering and automation to enter relevant enterprises for practical study every year and during winter vacation and summer vacation. Teachers participate in the actual industrial and project process operation of related enterprises to enhance their professional practice ability. Colleges and universities are based on the ability training of professional curriculum design and comprehensive experiment, so that students can improve their professional ability in the engineering practice. Based on professional training, teachers integrate enterprise project driving, encourage students to participate in Ge automation and Siemens intelligent manufacturing challenge, electronic design competition, NXP cup intelligent car competition, Challenge Cup and other scientific research training, and strengthen students' professional innovation ability. Focusing on the demand of practical talents cultivation, electrical engineering and automation specialty is bound to carry out more in-depth practical teaching, innovate talent cultivation mode, and increase cooperation between schools and enterprises. Only in this way can colleges and universities adapt to the development of the times and cultivate high-quality innovative and practical talents.

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