

## Research on the Education Mode of the Internet of Things for the Major of Mechanical and Electrical Engineering

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**Abstract:** Based on the support of industry university cooperation platform, this paper presents in-depth research and exploration on the Internet of things training mode of mechanical and electrical engineering specialty under the background of new engineering through the teacher training project. The application-oriented undergraduate major of mechanical and electrical engineering can be further upgraded according to the implementation plan. The new engineering personnel training program oriented to industrialization and intelligence should be carried out. It is urgent and feasible to cultivate the research and practice of mechanical and electrical engineering mode, which is of great significance to cultivate the new intelligent talents needed by the manufacturing industry in the future.

### 1. Introduction

The construction of new engineering is a major action plan proposed by the state to meet the challenges of new economy and new business forms, serve the national strategy, meet the industrial demand and face the future development [1]. The construction of new engineering has become a hot topic in the field of higher engineering education. Guangming Daily reported the new location of "new engineering" under the title of "new engineering facing the future", and the formation of construction action route for the development of new engineering [2]. It mainly analyzed the necessity of accelerating the construction and development of new engineering in Colleges of China. The construction and development of new engineering should take the new economy and new industry as the background, establish the "new idea" of innovative, comprehensive and full cycle engineering education, build a new structure of discipline and specialty combining new engineering and traditional engineering, explore the "new mode" of engineering education personnel training, create a "new quality" of engineering education with international competitiveness, and establish and improve the project with Chinese characteristics. The "new system" of education has realized the transformation from a big country of engineering education to a powerful country of engineering education [3]. The development of new economy and new business requires the layout of engineering majors to face the future.

As a typical representative of China's manufacturing pillar specialty, mechanical and electrical engineering related specialty should actively set up and develop new engineering construction on the one hand, and guide the reform and innovation of other engineering specialties on the other hand. However, at present, the talent training of mechanical and electrical engineering in China still lags behind the development of technological innovation and new industries [4]. Binzhou University is an application-oriented undergraduate college with aviation as its main feature, and also a typical representative of rapidly developing local colleges and universities many years of undergraduate education and exploration have gradually realized the structural transformation of higher education. In view of the background of new engineering, the training program has been revised many times, which good foresight for the transformation of talent training mode has caused by the information technology revolution. With the development of Internet of things technology, mechanical and electrical engineering specialty has a significant breakthrough and rapid development in the construction of high-quality courses, online and offline hybrid "golden course"

and other new reform courses. For example, mechanical drawing, theoretical mechanics, material mechanics and other courses can realize specific intelligent industrial teaching scenarios. Under the background of new engineering, Binzhou University, relying on local characteristics, is striving to build an advanced education mode matching with engineering education professional certification on the basis of aviation connotation construction. In addition, the Ministry of education provides the project of collaborative education of production, learning and research, which provides a very important shortcut for the development of ordinary undergraduate colleges.

## **2. Characteristics and Highlights of Education Reform**

### **2.1 The Goal of Teaching Reform**

Under the background of new engineering, the education mode reform of mechanical and electrical specialty should be fully realized. Through the construction of Internet of things technology, a demonstration teaching mode with the characteristics of first-class teachers, first-class teaching contents, first-class teaching methods, first-class teaching materials and first-class teaching management should be built. Ensure to meet the core requirements of improving the quality of personnel training, improve the central position of teaching work, with the goal of training high-quality personnel to meet the national and local development needs, with the focus on improving the market competitiveness of students, with the latest needs of industrial and technological development, promote the reform of talent training in Colleges and universities, innovate the talent training mechanism, and improve the quality of talent training. Specifically, there are the following sub objectives:

(1) Based on the teacher training program, we should cultivate and cultivate a high-level teacher team, strive to have a reasonable structure, a solid foundation, a high academic and teaching level, and a good teaching effect. Under the condition of Internet of things, the teaching content is rich and novel, and fully reflects the cutting-edge achievements of the discipline, and constantly updated.

(2) After the reform, the teaching mode meets the requirements of modern education, quality education and innovation education, forms the teaching methods and teaching means that are suitable for the characteristics of the application-oriented university courses with our own characteristics (aviation), and improves the students' innovation ability.

(3) There are complete three-dimensional advanced teaching materials and teaching auxiliary materials, high-quality practical teaching tasks, innovation and entrepreneurship base, and conditions for students to conduct subject competition and software learning related to information technology and intelligent technology.

(4) Through teacher training, teachers carry out relevant software learning and technical research, and carry out secondary development of various intelligent industrial design and engineering management software to provide services for the society. The establishment of multi-disciplinary and multi-disciplinary simulation experiment center realizes the systematic training of students' knowledge and ability in information and intelligence, and builds a learning, research and cooperation platform for students, teachers and enterprises.

### **2.2 Features and Highlights of the Project**

Through the development of this project, the teaching of mechanical and electrical engineering in Binzhou university can effectively integrate with the Internet+ Cloud computing, big data, intelligence, virtual reality technology and other emerging industries and formats, to create a first-class education model, effectively upgrade professional construction, to meet the needs of social and economic development, and to provide ideas and methods for the rapid development of other application-oriented ordinary undergraduate colleges and universities or majors [5]. Through the development of this project, teachers of mechanical and electrical specialty can master the teaching method of actual scene, use relevant IT technology, Internet of things technology and sensor technology to teach, present students with high integration and management of intelligent

classroom through modern teaching equipment, and fundamentally improve the traditional teaching mode.

Through the development of this project, the ability of infiltration, intersection and integration of different disciplines of local colleges can be improved, and the transformation, transformation and upgrading of engineering majors can be realized, which is conducive to timely adjustment of training objectives, revision of training standards and programs, innovation of training mode and reform of curriculum system [6]. It is conducive to timely updating the teaching content, enriching the research results of industry enterprises and teachers into the teaching, broadening students' vision, improving students' ability to respond to changes, updating the teaching content, and meeting the needs of current and future industrial development.

### **3. Teaching Reform Content and Implementation Path**

#### **3.1 Establishment of School Enterprise Cooperation Cloud Platform**

The school enterprise cooperation cloud platform is an advanced practical teaching method, but its development in China shows a more serious imbalance and uneven levels. For this reason, this project proposes to build a service-oriented cloud platform for school enterprise cooperation based on the teacher training of Honeywell tridium. The platform constructs a three-tier system architecture based on data access layer, business logic layer and presentation layer to support multi-party collaboration. Based on the cloud service platform, a multi-layer access control system is established to solve the problems of lack of standardized information management means in the existing technology of school enterprise cooperation management, lack of relationship network in the information system database, lack of close contact with the actual situation of school enterprise cooperation, few information system content projects, slow update speed and data sharing between departments [7]. Binzhou University actively gives full play to its advantages in close contact with the industry. In the face of current and future industry development needs, it introduces industry university cooperation, school enterprise cooperation and international cooperation into the process of talent cultivation, so as to realize the synchronization of talent cultivation and industry development, and promote the informatization development of mechanical and electrical specialty and the transformation and upgrading of traditional manufacturing industry.

Under the condition of school enterprise cooperation cloud platform, it can realize the joint training of new engineering talents of mechanical and electrical engineering specialty, jointly develop training programs, jointly build courses, jointly build internship training bases with enterprises, and further promote the cooperation between production and learning, integration of production and teaching, so as to lay the foundation and provide guarantee for the transformation and upgrading of traditional mechanical and electrical engineering specialty. Enterprises introduce knowledge of cloud technology and big data management, Internet of things technology, collaborative innovation, intelligent manufacturing into the classroom, and promote engineering education reform with the latest achievements of industry and technology development. The intelligent simulation experiment center built by the school provides an interactive platform for enterprises, teachers and students, promotes the application of enterprise technology, the development of teachers' technology and the practice of students' innovation, and achieves win-win results.

#### **3.2 Talent Training Program**

OBE (output based education) education concept is one of the core concepts of the Washington Agreement. It is a kind of education concept based on learning achievements or output, and it is the core content of engineering education professional certification system. Output or outcome oriented Education (OBE) follows the principle of "reverse design". Reverse design starts from demand, which determines the training objectives, the graduation requirements, and then the curriculum system. For this reason, this project is based on the teacher training of Honeywell tridium, and proposes to develop the personnel training program of mechanical and electrical engineering based

on the OBE concept and the requirements of new engineering [8]. This type of education mode can break the traditional evaluation system, and the revised training program can focus and organize every link of teaching more clearly, so that students can achieve the expected results in the learning process, which is the mainstream direction of the current engineering education reform. In addition, the project requires teachers to be clear about the requirements of students when they graduate, and then find and design appropriate and effective methods to achieve their goals. With the support of the teacher training program, the revised training program will provide important guidance and practical operability for the construction of new engineering specialty.

### **3.3 Development of Simulation Experiment Center**

The experimental center is an advanced practical teaching platform with the core of Internet of things technology learning and application. It can realize the experimental teaching under the "Internet +" environment with multi-disciplinary crossing and integration. The platform is also an important measure for the University and enterprises to build an industry college, which provides necessary support for enterprises to participate in personnel training in depth. However, teachers still lack of technical theory and system knowledge required for field equipment debugging and testing. Under the condition of teacher training, teachers can master the actual scene teaching work based on the Internet of things technology, and have the ability of comprehensive analysis and processing of high difficulty system integration technology and on-site debugging and testing, so as to improve the learning efficiency of students.

### **3.4 Collaborative Education Platform**

The construction of collaborative education platform has the characteristics of reflecting the characteristics of the times, involving a wide range, multi-disciplinary integration, multi-agent participation and so on. It is the crystallization of the development of new engineering. In order to achieve the goal of multi-body collaborative education in mechanical and electrical industry, enterprises, societies and schools, we have actively signed agreements with many enterprises with industrial chain, built a "3 + 1" model of collaborative education platform, and promoted the cooperation and integration of industry and education.

Under the platform of collaborative education, students can mainly study in school in the first three years and study and practice in different enterprises in the last year to achieve personalized selection, practical training, leading edge and quality training. Through "learning by doing" and "learning by doing", participate in the R & D projects and engineering examples of enterprises, and cultivate the comprehensive quality and engineering ability of future engineers. Experts from industry and enterprises are deeply involved in the training of students in school, teaching engineering practice, project whole process management, mechanical and electrical assembly technology and other practical cutting-edge courses, and cooperating with teachers to develop teaching materials. In addition, in the first half of the year when students enter the enterprise, professional and technical courses, industry norms, professional ethics and corporate culture can be taught by industry experts, and practical tasks can be integrated into enterprise production. In the second half of the year after entering the enterprise, on the basis of participating in the project practice, under the guidance of the enterprise tutor and the school tutor, the graduation project is completed based on the actual engineering project of interdisciplinary and advanced technology application.

## **4. Conclusion**

Under the condition of project implementation, this paper build a curriculum system of mechanical and electrical engineering based on intelligent industry, and formulate graduation essentials according to the OBE concept. The modular curriculum is constructed to break the discipline boundary according to the engineering logic. Integrate information technology and intelligent technology such as Internet +, Internet of things, cloud computing, big data, artificial intelligence and virtual reality, complete the interdisciplinary curriculum system, and carry out the

reconstruction of results oriented curriculum system.

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