

# Exploration on the Construction of School-enterprise Cooperative Practical Teaching Base for Cultivating "The New Engineering" Talents

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**Abstract.** With the transformation and upgrading of undergraduate universities to Application-oriented universities, university-enterprise cooperation and innovation education have become the only way to cultivate talents. With the continuous development of "the new engineering," a new round of teaching reform and teaching innovation construction in colleges and universities has been carried out in full swing. Under the current new education environment, university-enterprise cooperation is a necessary form of teaching reform in the recent engineering construction of universities. Adapting to "the new engineering" under the education development direction has become the point of contributions to its positive impact and the new starting point of the related teaching management research. Based on the college of information science and technology practice in our school, this paper takes the practice base of computer specialty co-built by school and enterprise for many years as the research object. It summarizes the implementation process of the training of "the new engineering" talents. It makes an exploratory conception of the construction idea of the practice base of School-enterprise cooperation under the new situation.

**Keywords:** School-enterprise Cooperation; The New Engineering; Teaching Reform; Practice.

## 1. The Background and Idea of Practice Teaching Base Construction for Cultivating "New Engineering" Talents

In recent years, the rapid development of information technology and penetration to the business areas, "Internet+" industry ecosystem rapid expansion. Information network as the critical foundation of economic growth and social progress and driving force further highlights the status of the new technology. The Internet of things, big data, cloud computing, and other new technology constantly create new services and business models. The "new engineering" advocates the new concept, new structure, new system, new quality, and the new model of the training of engineering professionals, which puts forward new goals, new directions, and new challenges to the engineering specialty. Engineering practice teaching in our country is relatively weak compared with foreign nations, which leads to the problems such as the poor adaptability of students and employers' dissatisfaction. For the teaching of engineering majors, practice is the most efficient way of learning, enabling students to learn professional knowledge better.

In 2019, China put forward the "Outline of the Development Plan for the Guangdong-Hong Kong-Macao Greater Bay Area [1]." From the perspectives of regional education development and international trends, talent cultivation and development in the Guangdong-Hong Kong-Macao Greater Bay Area should have national and regional consciousness and global perspective. It also should pay attention to the dual orientation of science and technology and humanities and refer to the education concept of the diversified Bay Area. As the advantage of the computer industry cluster in the Guangdong-Hong Kong-Macao Greater Bay Area, under the new situation of the country

vigorously promoting the construction of the Guangdong-Hong Kong-Macao Greater Bay Area, it will usher in a new wave of development. Industrial upgrading and development require universities to transport more excellent computer information applied engineering and technical talents. The practical teaching system and practical teaching base of computer specialty are the necessary supporting conditions for cultivating applied technical skills. To train computer Application-oriented engineering and technical talents in line with the computer industry's transformation and upgrading development needs in the Guangdong-Hong Kong-Macao Greater Bay Area [2]. According to the reform idea of "one center, double integration, and three dependences," practical teaching bases are carried out. With the cultivation of students' practical ability of engineering applied technology as the center, the integration of science-education and industry-education, we rely on the practical course teaching team, enterprise technical team, and innovation and entrepreneurship practice management team to implement the computer-related majors in school and enterprise practice teaching.

"One center" means to focus on the cultivation of students' engineering practice ability. By reforming the professional experimental course system, experimental platform, experimental content, and teaching implementation methods, "One center" improves engineering talents' ability. "Double fusion" promotes the innovation of practical teaching through the integration of science and education and the integration of industry and education. We encourage and support our teachers to transform the latest scientific research achievements and technical service programs into experimental and practical course teaching contents by entirely playing the advantages of scientific-technological innovation and service of colleges and universities. It also gives full play to the advantages of the Guangdong-Hong Kong-Macao Greater Bay Area and computer industry clusters, strengthens School-enterprise cooperation, integrates industry and education, coordinate education, arranges part of experimental teaching content in the enterprise learning stage of students, and build a team of enterprise practical teaching guidance teachers. "Three support," that is, relying on the experimental course construction team, enterprise technology team, and innovation and entrepreneurship practice management team. First, depending on the experimental course construction team, we upgrade and transform the professional experimental courses and develop new experimental projects. Second, relying on the technical team of Guangzhou Tengke Network Enterprise, we give full play to the innovative advantages of the course industry, participate in the teaching of experimental courses and the construction of experimental projects, and guide students in the engineering practice in the enterprise learning stage. Third, relying on the innovation and entrepreneurship practice management team and the relevant student innovation and entrepreneurship competitions, projects, certificates and other settings, extracurricular tutoring, and increase the opening of the laboratory, we encourage students to participate in innovation and entrepreneurship practice activities actively.

## **2. The Construction Target of Practice Teaching Base for Cultivating "New Engineering" Talents**

The establishment of the construction target of the "new engineering" talent practice base is directly related to the smooth implementation of the base. It is the premise of the construction of the practice base. The establishment of construction targets, neither too high nor too low, should comply with the principle of seeking truth from facts and the combination of inheritance and development. That is, to proceed from reality, we should not only inherit the achievements of innovative practice teaching in the past, but also study the development trend of innovative education and put forward forward-looking goals. Under the guidance of this ideology, we define the construction goal of "new engineering" talent practice base as an advanced teaching practice base with practice teaching as the focus. It becomes an innovative practice education base focusing on cultivating students' creative spirit, innovative ability, and improving students' practical ability such as the hands-on and brain-using ability. It becomes the practice base of innovation education and practice series curriculum system, content, method and means reform research; It becomes the college students' innovation and

entrepreneurship practice education and training base; It becomes the college students science and technology activities research and development practice base.

### **3. Exploration on the Construction Content of Practice Teaching Base for Cultivating "New Engineering" Talents**

The reform idea of "One Center, Double Integration and Three Dependencies" [4] has helped us to implement a practice teaching base for "new engineering" talents majoring in computer science and technology, software engineering, network engineering, Internet of Things engineering, and digital media technology. The experimental and practical curriculum system is stratified and modularized. A new practical teaching quality evaluation system is established, and a High-level Double-qualified teaching team is set to cultivate applied talents.

#### **3.1 The Experimental and Practical Curriculum System is Layered and Modular**

First, the hierarchical structure of computer professional experimental and practice courses was optimized to clarify the hierarchical structure of professional experimental and practice courses. The experiment and practice courses were divided into four levels. The content of the levels involved basic, professional, comprehensive design, and engineering practice. According to the training objectives of computer Application-oriented talents in the Greater Bay Area and the law of computer engineering literacy cultivation, we offer professional experiments and practice teaching at different levels. The training objectives and objectives of each part are defined. The first level is to build a practice teaching base according to the school's positioning and the characteristics of disciplines and specialties and jointly build "professional cognition and industrial cognition." In the first year of our college, we offer professional introduction courses and cognitive practice. The introduction courses are divided into several topics, which are taught by enterprise engineers and famous teachers in the industry. In the cognitive practice stage, enterprise teachers take students to visit and study in relevant enterprises. We pay attention to the cultivation of "experimental practice ability" at the second level (the sophomore year). The experimental courses are divided into confirmatory experimental projects and comprehensive designed experimental projects. The proportion of comprehensive experimental projects set up in our school reaches 98%. That is, each experimental course is equipped with comprehensive or designed experimental projects. The third level, we pay attention to cultivate "comprehensive practical ability," 1 to 2 project is arranged at the end of each term, the enterprise of the actual project case was brought to campus teaching practice. At the same time, we pay attention to cultivating and encouraging junior students in innovative entrepreneurial teams to participate in the creative entrepreneurial class project under the guidance of teachers, competitions, and textual research, etc., To enhance their innovative spirit, practical ability and social responsibility. At the fourth level (the fourth year), we should focus on cultivating the practical teaching framework of "comprehensive practice and innovation of engineering", and integrate the engineering education concept into the teaching process of the practice base by combining the learning improvement of various links such as comprehensive practical training, graduation practice and graduation design.

Secondly, an experimental curriculum system was modular design. According to the teaching objectives of practical courses, the main contents, and steps of corresponding experimental practice teaching modules are formulated to break the boundaries of the independent experiment of courses, avoid disordered experiment setting and possible cross repetition, and establish a comprehensive practical teaching system. The comprehensive design breaks the closed system of a single curriculum, pursues the comprehensiveness and integrity of practical teaching system and content, and forms a multi-module practical curriculum system.

Third, constantly reform and improve the experimental practice curriculum and project teaching content resources. According to the development law and trend of computer technology, relying on the high-quality teachers of the college and the practice teaching base, we have set up a team of High-level experimental practice teaching guidance teachers. First, relying on the experimental curriculum

construction team, tapping the potential of existing experimental practice courses, continuously updating and developing experimental practice courses and teaching resources with diverse levels, rich contents, diverse reading methods, and flexible opening methods. Upgrade and transform professional experimental courses, develop new experimental projects; Second, relying on the technical team of Guangzhou Tengke Network Enterprise, we give full play to the innovative advantages of the course industry, participate in the construction of experimental course teaching and practical projects, and guide students in the engineering practice in the enterprise learning stage. Third, we rely on innovation and entrepreneurship practice to manage the teacher team. According to relevant student innovation and entrepreneurship competitions, projects, and certification Settings, we provide extracurricular tutoring to students and encourage students to actively participate in innovation and entrepreneurship practice activities.

### **3.2 Establish a New Evaluation System of Practical Teaching Quality Process**

To ensure the quality of practical teaching and make the practice base play its due role in cultivating applied talents, it is urgent to establish a new process evaluation system for the quality of practical teaching. In the course practice teaching, the critical examination content should be the student's comprehensive practice ability. We divide the whole practice process into the preparation stage, operation stage, and summary stage. In the preparation stage, we mainly emphasize the correctness of project analysis and design and evaluate students' logical thinking ability and exploration ability. In the operation stage, we highlighted the correctness and standardization of the project design and the correctness and completeness of the results. The students' practical operation ability and resource useability are mainly evaluated. The summary stage especially emphasizes analyzing and thinking of the problems in practice. We mainly evaluate the students' report writing ability, knowledge summary ability, and expression ability.

### **3.3 Establish a High-level Double-qualified Teaching Team for Application-oriented Personnel Training**

Another critical point to ensure the effective implementation of practice teaching base lies in constructing a practice teaching team. That's the construction of the experimental course construction team, enterprise technology team, innovation, and entrepreneurship management team. The training of these team teachers is mainly through the following aspects: First, support and encourage young and middle-aged backbone teachers to visit schools and study for doctoral degrees. Through the mode of "bringing in, going out," 3-4 outstanding young backbone teachers are selected and sent to relevant enterprises in a planned way every year to exchange, study, and exercise to improve teachers' engineering practice ability. Secondly, we should increase efforts to introduce High-level talents, comprehensively implement policies and measures to stabilize High-level talents, improve professional titles and academic qualifications, and form a Double-qualified teaching team with reasonable structure and high quality. Outstanding engineers were invited into the classroom, and enterprises were introduced to join the project practice actively at the same time. As a clear double-type teaching team, the school teaching masters with project background for the leader, school teachers, and School-enterprise training teachers complement each other. They also have advanced teaching ideas, a solid theoretical foundation, rich experience in engineering projects.

## **4. Conclusion**

In conclusion, the construction of a university-enterprise cooperative practice teaching base plays a decisive role in cultivating new applied talents of computer engineering in the Guangdong-Hong Kong-Macao Greater Bay Area. To establish an excellent cooperation mechanism between colleges, based on sufficient investigation and research to strengthen the system construction and the quality standard system construction, and in the establishment of the professional talent training scheme, course construction, project practice, graduation practice management, and so on each link carries on

the strict supervision and monitoring, ensure the quality of the cooperation between colleges and to explore the new practice base construction pattern of win-win cooperation. School-enterprise cooperation and collaborative innovation are the eternal themes of The Times. Guangzhou Tengke., Ltd. and SCBC have built a practical teaching base for college students with School-enterprise cooperation in Guangdong Province. By constructing a scientific and sound base management organization and management methods, SCBC has carried out innovative talent training to achieve the goal of "cultural education" and "innovative education."

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