Industry-Education Integration Mechanism About Electronic Engineering Talents Training System in Industry-Oriented Local Universities Under the Background of New Subjects

Yuan LUO, Zhang-Fang HU and Hong-Gang HAO

College of Optoelectronic Engineering, Chongqing University of Posts and Telecommunications, Chongqing, China

Keywords: New Engineering, Education and Industry Integration, Education and Science Integration, Wide Major

Abstract. Chongqing University of Posts and Telecommunications (CQUPT) is an industry-oriented local university which is jointly built by the Ministry of Industry and Information Technology (MIIT) and the Chongqing Municipality. It has been developing the training of talents for the major of electronic engineering for several decades. The strategy of developing electronic information industry in Chongqing has brought new opportunities and challenges for schools to train electronic engineering talents adapted to industrial and regional economic development. Under the background of the new engineering education, in order to actively adapt to the needs of local economic development, improve the quality of talent training, enhance the regional contribution of schools and the influence of the industry. CQUPT has constructed a training system for electronic engineering talents by absorbing the requirements of new subject construction and the concept of Engineering certification, which taking integration of Industrial Education and Scientific Education as the core. In this paper, the fusion mechanism of Industrial Education and Scientific Education in the system is discussed, so as to provide a reference for the construction of new disciplines related to those similar universities.

1. Introduction

In 2017, a seminar on development strategy of comprehensive engineering education in Universities was held by Fudan University, which reached the Fudan Consensus on The Construction of “New Engineering”. The Fudan Consensus proposes to serve a new economic development, which is characterized by new technology, new format, new industry and new modes. With the guidance of industrial demands, a number of new engineering specialties are developed, also the reform and innovation of existing engineering specialties are promoted either. In order to develop “New Engineering”, cultivate new types of engineering specialties, connect with new industries and serve the new economy, engineering education and industrial development are closely linked, which is both an urgent task and a long-term strategy [1-2]. In March and April 2017, two rounds of seminars were respectively held in Zhejiang University and Tianjin University on the construction of new disciplines in universities with engineering advantages. The action route of “New Engineering” was further determined at the seminars, which included three major objectives and seven actions [3]. But the philosophy and the paradigm transformation the “New Engineering” really brings are that to let students study under a wider discipline vision and to let the innovation chain can be able to extend fully [4].

Make full use of local resources to meet the needs of social economic development and technological innovation in enterprises. Deepen the integration of industry-education, school-enterprise cooperation, and collaborative education. The transformation of traditional engineering specialties are promoted and upgraded by the involving of local colleges and universities, which is the core of developing new scientific research and practice in local colleges or universities [5]. It is necessary to explore both the major training schemes about the deep integration of industry, education, research and the mechanism which integrates the industrial education with scientific education.
2. Talents Training System Construction for Major in Electronic Engineering

Based on the cultivation of innovative talents, the requirements of economic and social development must be met. Take “The guidance of government and the collaborative education” as grasps firstly. And then the concept of talent training is formatted based on deepening integration of industry improving dual-creative ability, and expanding international vision. Through the mentioned above, the training objectives could be orientated scientifically. Furthermore, the major needs of industry and local economic and social media should be quickly responded. Deepening the cooperation between the four aspects such as politics, production, learning and research with international based on the idea of “Multiple Synergies”. In accordance with the training objectives, the 2+2 training program of system science should be optimized. And the training program should pay attention to the three-dimensional training such as Knowledge-Quality-Ability of new subject talents. Fig. 1 illustrates the three-dimensional of new engineering talents training mentioned above.

Figure 1. The Dimensions of New Engineering Talents Training.

Establish a three-node major training curriculum system. The three key training nodes mean from enrollment to major professional diversion to graduation. And major categories, professional engineering guidance and engineering projects are set up respectively in those nodes to constitute the main axis of professional core competence training. Students' engineering ability and innovative concepts are strengthened through different forms and courses. The proposed curriculum system is illustrated in Figure 2.

Figure 2. Three Node Curriculum System Developed by Major Professional Training.

A multidisciplinary cross sharing practice platform for collaborative education is constructed based on the idea of “all-industry chain capability-oriented” and referring to the achievements of international engineering education reform CDIO. Strengthen the construction of teaching platform by taking the knowledge chain and industry chain of electronic information industry as the
constructive main thread. The multidisciplinary cross sharing practice platform including four level-classroom teaching, experimental teaching, engineering training and innovation practice, which construct a comprehensive engineering training system.

3. Collaborative Education Platform Construction for the Integration of Industrial Education and Scientific Education

The board of directors of CQUPT is a non-legal entity established on October 16, 2010 with the consent of the Chongqing Municipal People’s Government and the administrative department of education, which is also supported by the Ministry of Industry and Information Technology. It is an important carrier to support the development of the cause of education and promote the close integration of education, science and technology with economic and social development.

The entity is an open platform for strengthening cooperation between industries, universities and research institutes, which can support schools and directors to establish long-term stable and comprehensive cooperative relations. It is also a deliberative body to guide and consult the strategic plannings of the school development, the construction of disciplines and specialties, the mode of personnel training, the quality assurance of running a school and foreign cooperation or exchanges etc.

In 2010, the Chongqing International Semiconductor Institute and the Chongqing International Semiconductor Institute Council were established with the support of Chongqing Municipal People’s Government, which has combined some important semiconductor and electronic enterprises, research institutes, industrial organizations and industrial parks at home and abroad. A new mode of joint school-running by the government, industry and schools was opened. And a supply-demand dual model was established to provide supports for the development of education, the improvement personnel training quality, the promotion of academic research and cooperation between industries, universities and researches.

A diversified platform for collaborative education of industry and education is jointly constructed and improved relying on the school board of directors, college councils and related industry alliances, as well as activating the institute's photoelectric information sensing and transmission technology key laboratory and other six provincial and ministerial scientific research bases and related research team's endogenous energy.


The teaching is promoted, and the professional characteristics and height are highlighted with the advantages of “The three Chips in CQUPT” and a series of sensor devices and system scientific researches. Through vigorously implementing the undergraduate innovation and entrepreneurship training, undergraduate scientific research training and upgrading programs and other effective means to make scientific research and innovation team teachers undertake teaching tasks of undergraduate. All the research platforms of national and provincial level should undertake innovation and entrepreneurship education, and also the teaching contents of scientific research achievements should be solidified.

Through the implemented systems such as Implementing Measures of Scientific Research and Training Program for College Students of Chongqing University of Posts and Telecommunications, Project Management Measures of Innovative Experimental Program for College Students of Chongqing University of Posts and Telecommunications, Opinions of Chongqing University of Posts and Telecommunications on Accelerating College Students’ Innovative and Entrepreneurial Work, and Scientific and Technological Activities of Chongqing Institute of International Semiconductors Management Measures etc., scientific research achievements are entered into textbooks, and scientific research teams are entered into classrooms as well as scientific research topics are entered into teaching contents. And scientific research resources are transformed into innovative platforms and engineering projects are converted into practical training topics. Therefore,
the integration mechanism of science and education called “Three Entering-Two Transformation-One Synchronization” is constructed which synchronizes both innovative projects and frontier technology.

The council and industry alliance should be used as a link to strengthen the “political, industrial, academic, research and application” and international cooperation, through that the depth of professional industry and scope of vision are expanded. The board of directors, council and the alliance units has been conducting consultation and guidance on the school-running objectives, development plannings, specialty settings and personnel training under the framework of the Articles of the Board of Directors of Chongqing University of Posts and Telecommunications and the Articles of the Board of Directors of Chongqing International Semiconductor Institute. The relevant units have been participating in the design of the 2+2 experimental class and the consistent innovation class. 2+2 or 3+1 training classes and other diversified electronic engineering training programs. The training of teachers’ exchange-teaching-practice-internship-training-employment of comprehensive services are provided, which closely link to industry or enterprise demands, personnel training, curriculum and teaching process and personnel output.

The implementation of the “Top-Bottom whole process mode” integration mechanism, which involves the whole process of teaching and learning provides strong support for platform co-construction and sharing, training and exchange of teachers, internship and training of students, and the employment of graduates. Above all, a tightly coupled mechanism of educating through the cooperation in scientific and education is constructed.

5. The Effect of Implementation

Through reformation and practice, professional construction has achieved good results. Optoelectronic Information Science and Engineering in wide major has been approved as the major include three specialties in Chongqing. Electronic Science and technology has become a municipal big data professional and intelligent major in Chongqing, whose four majors all have been included in the three professions group construction of Electronics Science and technology in Chongqing. In terms of personnel training, the students’ ability has been effectively improved by the construction to create both jobs and competitiveness. It directly benefits more than 2,000 students.

100% students have been accepted innovation and entrepreneurship education, and 80% of them have been received innovation and entrepreneurship training. The participation rate of all kinds of innovation and entrepreneurship competitions is 50%. The provincial and ministerial level awards were nearly 30%. In the past three years, excellent results have been achieved by students of microelectronics who were participant in different kinds of competitions such as the “Internet +”, “Challenge Cup”, The National Electronic Design Contest, The Competition of IC Design for University Student, The TI Cup, National Contest of Maths Models, and Mathematical Contest In Modeling, which organized by the United States.

The one-time employment rate of students majoring in this major has reached at 95% and the enrollment rate for postgraduate entrance examination has been maintained at 19%-25%, which have always been in the forefront of Universities in Chongqing. The employment quality is high enough, and these students have been widely recognized as having a solid foundation and a strong ability, which has been forming a brand effect. More than anything, the effect of running a school is recognized by the society.

Acknowledgment

The study is funded by the major research project of Chongqing Higher Education Reform “Reform and practice of new engineering talents training mode in Electronic Engineering” (171014).
References


