Construction and Practice of Characteristic Specialty in Universities

Hong YANG, Zhi-Peng WANG and Jin-Chen ZHU

Chongqing University of Posts and Telecommunications, Photoelectricity Engineering College, Chong Qing, China, 400065

yanghong@cqupt.edu.cn, wangzp@cqupt.edu.cn, 18883994461@163.com

Keywords: Construction of characteristic specialty; Training plan; Education; Cultivation of talents.

Abstract. The article is aimed at the construction of national-level specialty of “Microelectronics Science and Engineering” of Chongqing University of Posts and Telecommunications. According to the relevant policies and regulations of the Ministry of Education and the Chongqing Municipal Education Commission, the implementation opinions on the development of microelectronics science and engineering professional training programs are proposed, combined with the school background. Based on the school background and current situation, the research content, objectives and problems to be solved are put forward, and the expected benefits of this construction project are finally put forward.

Development of Training Program

The training plan is the concentrated reflection of the train of thought and the goal of professional talents training in schools. It is also the basic document for schools to organize teaching and to monitor and evaluate the quality of education and teaching. In order to meet the needs of the current social and economic development and international competition for talent cultivation, according to the development orientation of our university and the goal of talent cultivation, the Ministry of Education issued the "China General Colleges and Universities Undergraduate Specialty Settings Complete" and the Ministry of Finance of the Ministry of Education's Opinions on Implementing Undergraduate Teaching Quality and Teaching Reform Project in Universities and Universities, "Some Opinions of the Ministry of Education on Further Deepening the Reform of Undergraduate Teaching and Improving the Teaching Quality in an All-round Way" and "Some Opinions of the Ministry of Education on Improving the Teaching Quality of Higher Vocational Education in an All-round Way." we formulate the training program for the construction of microelectronics specialty in our university, and put forward the following suggestions for implementation.

Guiding Ideology

Guided by Deng Xiaoping Theory, the important thinking of the "Three Represents" and the spirit of the 16th National Congress of the Communist Party of China, the spirit of the times that "education should face modernization, face the world, and face the future" should be completely reflected. Implement the party's education policy and the Higher Education Law of the People's Republic of China.

Explore innovative talent training models. Vigorously implement the "people-oriented, all-round development" talent training strategy, based on the actual situation of the school, on the basis of the implementation of the complete credit system, pay attention to the combination of science and engineering, cultural and intellectual penetration, the implementation of minor, second major, second degree and other cross-cultivation Mode, strive to cultivate innovative talents with “wide caliber, thick foundation, strong ability, high quality” and adapt to international competition and social needs.
**Talent Training Goal**

Cultivate socialist successors and builders with good ideological and moral qualities, physical quality, mental health, solid professional knowledge and skills, innovative ability and innovative spirit.

**Talents Training Level and Specifications**

Mainly cultivates application-oriented and research-oriented talents required for undergraduate level microelectronics and information industry and local economic and social development.

**Basic Principles**

In order to achieve the goal of talent training and meet the requirements of talent training objectives and specifications, the following principles should be followed when formulating the training plan:

Adhere to the principle of developing talents in all aspects of moral, intellectual, physical and aesthetic development.

Reflect the school's guiding ideology for running a school, in line with the school's development orientation and talent training goals.

Strive to absorb advanced educational ideas and educational concepts at home and abroad, strengthen education and teaching reform, and build a talent training system that meets the needs of social and economic development.

Follow the rules of education and teaching and reflect the principle of overall optimization.

Education and teaching have its own internal laws, formulate training programs to scientifically deal with the relationship between various teaching links, the relationship between various disciplines and majors, and focus on the following:

a. Coordination between course theory teaching and practical teaching.

b. The continuity and inheritance of the teaching content and teaching links between courses.

c. The reasonableness of the student's learning burden during each semester; the possibility of students' self-learning.

Formulate training programs and adhere to the principle of combining unity and diversity.

Optimize the curriculum system, reform the teaching content, continuously introduce new ideas, incorporate new knowledge, new content, new methods, new technologies, etc. into the curriculum system optimization and teaching content; reduce the repetition of the same teaching content by integrating teaching content, Improve teaching efficiency.

Focus on basic theory and basic skills, highlight information features:

a. Adopt the basic platform and basic course module structure, strengthen the cultivation of students' basic theories and basic skills, and highlight the characteristics of information.

b. Construct seven major curriculum modules and public foundation practice platforms such as ideological quality foundation, physical quality foundation, college English, public computer foundation, public mathematics foundation, university physics, and communication information foundation to strengthen the foundation.

c. Continuous foreign language teaching.

d. Intensify the reform of foreign language teaching, strive to improve the quality of foreign language teaching, and focus on cultivating students' listening, speaking, reading and writing skills. In the training program, two or more courses are carefully selected for bilingual teaching, and the “Excellent Information Science and Technology Series Teaching Book (Photocopy)” recommended by the Higher Education Department of the Ministry of Education is especially advocated.

e. Computer teaching is continuously in progress within four years; the on-board computer (excluding graduation design) is arranged for no less than 200 hours.

Focus on practice, highlight innovation, and cultivate scientific literacy.

Strengthen comprehensive ability and professional quality. Set up comprehensive frontier courses and set up special topics in the course combined with scientific research. According to the professional training requirements of the Ministry of Education, set the time and quality requirements for graduation design (thesis).
Status and Background Analysis

Photoelectricity Engineering College of Chongqing University of Posts and Telecommunications has a master's degree in electronic science and technology (including electromagnetic field and microwave technology, microelectronics and solid electronics, circuits and systems, physical electronics, four secondary disciplines), theoretical physics Master of Programs and Master of Enrollment in Integrated Circuit Engineering. It has four undergraduate majors: Microelectronics Science and Engineering, Optical Information Science and Technology, Electronic Science and Technology, and Electronic Information Science and Technology. Microelectronics Science and Engineering is a national-level specialty.

Judging from the current situation we understand, many talent training models built by higher education institutions emphasize thick foundations, wide calibers, the integration of disciplines and the ability of cultivating students' basic research, but neglect the application of research capabilities and techniques to students. This is worthy of our consideration. Our consideration is to explore the reform of education and teaching in light of the actual situation of our school.

Our school has always attached great importance to the reform of education and teaching. Under the leadership of the school, through the series of reforms and explorations of the Academic Affairs Office, the Teaching Experts Group and related teaching management departments, our school’s education and teaching reform has achieved great results. The improvement of the overall quality of the school has played an important role. At the same time, relevant work has accumulated valuable experience for us to further deepen education and teaching and its reform and development. To this end, we must fully learn from the advanced education ideas of colleges and universities in the talent training mode, but also fully consider the characteristics of our school and the positioning plan of our school to form the best mode for the cultivation of microelectronics science and engineering professionals in our school, and cultivate outstanding talents for the country's modernization.

Research Content, Goals, Problems to be Solved and Main Features

The main content and objectives of the proposed reform of this project are based on our basic understanding of education and teaching reform, as well as the successful training experience of microelectronics science and engineering professionals at home and abroad and our education and teaching reform. Its main content and goal are to further clarify the training objectives and ideas, and to combine the school's and our hospital's goal orientation, hierarchical positioning, subject orientation and service orientation, and intend to conduct more in-depth exploration, research and practice from several aspects.

Optimize Training Goals

On the basis of in-depth research on domestic and foreign microelectronics education and teaching methods, the relevant personnel of the organization research group gradually formed a micro-electronic science and engineering professional training model with the characteristics of our school.

Strengthen the Foundation

Continue to adhere to the principle of downplaying the profession and consolidating the foundation. Based on the cultivation of talents with thick foundation, wide caliber, high quality, strong ability, harmonious culture and individuality, we adhere to the principle of teaching students in accordance with the principle of "cultivating diverse specifications and individualized growth programs" in talent cultivation.

Features and Problems

The main feature of the reform of this project is to emphasize both cultural quality and scientific literacy, with equal emphasis on science and technology. The concept is to cultivate high-level applied research talents with the development of knowledge, ability and quality, innovative spirit, innovative ability and hard work. The main features of the construction of this major:
In terms of laboratory construction, the currently established microelectronics process laboratory (central and local co-construction laboratory project) is not only an experimental internship for students of microelectronics science and engineering majors and other professional students, but also the experimental bases of universities such as Chongqing University, Guangdong University of Technology and Chongqing Technology and Business University. At the same time, the IC Design Lab (central and local co-construction laboratory project) obtained the University Program EDA tool provided by world-renowned company Mentor Graphics. Relying on the TD-SCDMA mobile phone chip research and development department of our school, the company is engaged in the construction of disciplines and specialties.

In terms of the off-campus practice base, We have cooperated with companies such as Electronic Technology Group 24, 26, 44 Research Institute, Southwest Integrated Circuit Design Co., Ltd., Ministry of Information Industry Putian Group 515 and China Telecom, China Mobile, and China Unicom's Chongqing Company to form a multi-faceted practice base.

At present, "Microelectronics and Solid State Electronics" has applied to the key disciplines in Chongqing and the "Microelectronics Engineering Key Laboratory" in Chongqing, and is applying for a Ph.D. in microelectronics.

With the above favorable conditions, in order to realize the education and teaching concept of the school, we will comprehensively promote the coordinated development of various tasks through teaching construction and reform, and solve the following key problems.

In terms of training management, according to the basic requirements of the school and the actual situation of our school, in the first year of freshman enrollment, all students, regardless of majors, are trained according to the major categories of integrated circuit engineering, and study public basic courses. In the second year, students will be free to choose a major. From the second semester of the second year to the third year, students begin to learn professional basic courses. At the same time, the content of student status management, class tutor system, special requirements and incentive system will continue to be studied, and an effective management method for microelectronics science and engineering specialty talents will be formed.

**Expected Result**

The theoretical significance of this project lies in the construction of microelectronics science and engineering specialty. As a combination of the popularization of higher education and the elite of traditional higher education, it has always been an important aspect of education reform and development practice in related universities.

From the current national economic construction and social development to the demand for training talents in higher education institutions, attaching great importance to applied research capabilities, technological development and innovation potential, as well as the spirit of solidarity and cooperation and serving the society and serving the motherland have become the general consensus of the employing department. Undoubtedly, our special professional education and teaching should be able to fully adapt and lead this new form, which is also the practical significance of this project. Its expected benefits are as follows.

Adhering to the concept of comprehensively improving the quality of students, the Institute will formulate a talent training program and a teaching plan adapted to the development of outstanding students according to the school's guiding ideology, and optimize the curriculum structure as a whole. At the same time, the college will arrange excellent teachers to teach the curriculum, emphasize the cultivation of basic theories and basic knowledge, focus on the training of thinking methods, thinking methods and engineering technology ideas, pay attention to the cultivation of students' English and practical skills, and fully mobilize the enthusiasm and initiative of outstanding students.

In the first three years, students will complete the basic courses, professional basic courses, major professional courses and basic skills training through "course teaching" and "experimental teaching." In the fourth year, they will complete R&D training, corporate training and comprehensive thesis
training through “practical teaching” mainly in research institutes, key engineering laboratories or enterprises.

To enable outstanding students with the ability to give full play to their specialties, expand their abilities, enhance their ability to compete in employment, and deliver quality graduate students for relevant disciplines.

Acknowledgement

This research was financially supported by: Major Research Project of Chongqing Higher Education Teaching Reform (Project No. 191045).

References

[1] Opinions of the Ministry of Finance on the implementation of undergraduate teaching quality and teaching reform projects in higher education institutions.
[2] China's general higher education undergraduate majors set up Daquan.
[3] The Higher Education Law of the People’s Republic of China.
[4] Several Opinions of the Ministry of Education on Further Strengthening Undergraduate Teaching in Colleges and Universities.
[5] Several Opinions of the Ministry of Education on Further Deepening the Reform of Undergraduate Teaching Reform to Improve Teaching Quality.
[6] Several Opinions of the Ministry of Education on Comprehensively Improving the Teaching Quality of Higher Vocational Education.
[7] Chongqing University of Posts and Telecommunications Undergraduate Training Program.