# Training Scheme of Computer Science and Technology Specialty Based on Engineering Education Professional Certification

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**Abstract**: Engineering education professional certification has important guiding significance for the standardization of higher education, which development could effectively improve the quality of higher engineering education, ensure the training level of engineering talents, and promote the benign flow of engineering talents in the international community. In order to make the innovative talents training plan of computer specialty meet the needs of modern talents better, this paper analyzes the current situation of engineering education certification of computer specialty and studies the application of innovative talents training of computer specialty based on the engineering education certification standard, including training objectives, graduation requirements, curriculum system, faculty, cooperation between schools and enterprises, quality assurance and continuous improvement. The research is helpful to continuously standardize the talents training process in colleges and universities, improve the quality of talents training, and make the trained talents meet the quality standard requirements of computer industry.

## 1. Introduction

In recent years, engineering education professional certification has been widely recognized by engineering education circles at home and abroad. This certification can effectively improve the quality of training and the promotion of the development of new industries, which makes engineering education professional certification in promoting social and economic development in the role of increasing [1]. Computer major is one of the engineering majors with the largest number of students in colleges and universities in our country. The original training system is not suitable for the implementation of the current standards of engineering education certification. Therefore, we have carried out research on the training mode of computer professionals, reformed the training objectives, graduation requirements, curriculum system, teaching staff, school-enterprise cooperation, teaching quality assurance and continuous improvement, carefully considered the potential impact of engineering education professional certification system on the training of innovative computer professionals. Good results have been achieved for the practice of training computer professionals in accordance with the internationally accepted standards of engineering education.

## 2. Analysis of the Current Situation of Computer Talent Training System in Colleges and Universities

Professional certification of engineering education is a kind of quality assurance activity, which is the quality evaluation of engineering specialty in colleges and universities by the professional certification association of engineering education. At present, many colleges and universities at home and abroad rely on engineering education certification to realize the training of applied talents [2]. In 2017, the development of "new engineering" has clearly defined the important position of computer specialty in the future training of engineers. The work of domestic colleges and universities in this field is still in the initial stage, especially for the colleges and universities that we

serve the local areas, the training reform of computer specialty in the new era is gradually unfolding, However, at this stage there are the following major problems.

### 2.1. The Training Target Is Not Accurately Positioned And Lacks Sufficient Support

Many colleges and universities will set different training objectives due to different positioning or regions, Although the undergraduate computer major has developed to a certain scale, the concept of school training objectives is vague, the words "senior talent" and "compound talent" in the training plan lack sufficient basis the personnel training mode, training structure and hierarchical system are not perfect enough to provide a clear supporting relationship for the final training objectives.

### 2.2. The Existing Teaching Mode And Curriculum System Do Not Clearly Support The Training Objectives

With the rapid development of the network, the teaching reform in colleges and universities has changed with the arrival of "internet plus". However, it is not an entirely in the professional personnel training system. The current teaching mode reform is only to enrich learning resources, but there is no educational data to monitor the personnel training situation in real time. In this way, it is impossible to ensure the achievement of the training objectives. The data generated by students in the learning process do not reflect the due value to the teaching reform. Therefore, to study the training system for computer professionals, it is necessary to reform the existing teaching mode, especially through reasonable analysis, to determine the support and degree of completion of each teaching link to the training objectives. The students required in engineering certification have insufficient ability to solve practical problems in complex engineering.

### 2.3. The Traditional Educational Concept Has Not Been Updated In Time

The concepts of "student-centered", "OBE", "continuous improvement", "green project" and "innovation and entrepreneurship" have not been deeply rooted in the hearts of the people. Discipline orientation and input orientation are still deeply rooted and insufficient attention has been paid to the two key words of "student" and "learning". The degree of cooperation between computer specialty and enterprises is not close enough, and the participation of enterprises is not enough in the process of personnel training.[3]

### 2.4. The Quality Monitoring System For Personnel Training Is Not Perfect

The quality monitoring system of talent cultivation has defects and fails to implement the whole process of talent cultivation. First, the evaluation criteria for the quality of personnel training are mostly formulated by the institutions themselves, lacking objectivity and credibility, and the graduation requirements of students are far from the standards for industry development and enterprise employment. Second, quality control is not in place in the process of talent cultivation, often paying more attention to the teaching process, but ignoring other links, failing to implement quality control in the whole process of talent cultivation.

## 3. Discussion on Engineering Education Certification for Computer Major

The training goal based on the engineering education certification is to take the ability as the core, its professional establishment should proceed from the social demand rather than the discipline itself, combine the concrete demand of the engineering certification and the main deficiency at present, discuss from the following several aspects.

### 3.1. Develop Training Objectives For Computer Majors Under The Background Of Engineering Education Professional Certification

There are two main points in the "training target" index: first, the target positioning should be accurate; second, the target can be continuously improved. The training objectives are determined by four aspects: training level, training type, training direction and training characteristics. Colleges

and universities generally determine the training level according to the school level, the training type according to the social demand type, the training direction according to the demand post, and the training characteristics according to the school running characteristics.

The certification standard for engineering education mentions "solving complex engineering problems" many times, the essence and key of which is to cultivate and improve students' ability to "solve complex engineering problems". The essence of problem solving is the process of a series of thinking activities guiding practical actions. The level of thinking ability determines the efficiency and quality of problem solving. Computer students must have efficient computational thinking ability to solve professional problems. The training objectives of computer major students in colleges and universities should focus on the two focuses of "computational thinking ability" and "system design ability", based on social needs, and should be formulated in combination with the actual running situation and advantageous resources of our school.

### 3.2. Graduation Requirements Cover All Aspects

The "graduation requirements" index of the general standard of "graduation requirements" covers 12 aspects of engineering knowledge and problem analysis, which reflect the comprehensive qualities and abilities that students should possess, as well as their professional qualities and abilities. The content of the 12 aspects is suitable for all engineering majors. How to reflect the graduation requirements of different majors in different levels of colleges and universities is mainly reflected by the talent training plan and its curriculum system construction. Therefore, the training links of the talent training plan should cover the 12 aspects specified in the general standard and explain how to realize it through teaching activities. The curriculum and its syllabus support the attainment of graduation requirements, and the attainment of graduation requirements supports the attainment of training objectives. How to evaluate and prove the achievement of graduation requirements? The evaluation of graduation requirements and achievement of training objectives must be broken down into tracking and process-based evaluation of the whole learning process of students. [4]

### 3.3. Constructing a Scientific and Reasonable Curriculum System

Graduation requirements for computer major include many requirements for students' scientific literacy, knowledge structure, comprehensive ability and innovation consciousness. Each different training requirement requires multiple teaching links to be realized. Each graduation requirement needs to be broken down into specific index points that can arrange teaching activities and measure their effects. At the same time, the realization of each index point can be undertaken by multiple teaching activities. The construction of curriculum system should fully reflect the characteristics and requirements of engineering education. According to the teaching principle of "strengthening foundation, paying attention to practice and cultivating ability", a curriculum system with thick foundation, fine content and multiple choices is constructed. In the construction of the professional curriculum system, the curriculum platform is set up according to the four modules of general knowledge foundation, subject foundation, professional foundation and professional curriculum, and the teaching method of compulsory and elective courses is adopted, focusing on students' mastery of basic knowledge, basic theory and basic skills.

### 3.4. Strengthen the Construction of Teaching Staff

In terms of teachers, engineering education certification requires teachers to have rich engineering practice experience, lofty professionalism and professional ethics, and excellent practical teaching ability. The appointment and assessment of teachers should shift from focusing on the research level of evaluation theory to focusing on evaluation of engineering project design, patents, combination of production and learning and technical services. Full-time teachers are required to have 1-2 years of working experience in enterprise engineering positions. Therefore, when adjusting the structure of teachers and introducing new teachers in the future, colleges and universities should pay attention to cultivating the engineering practical ability of the current young and middle-aged teachers, gradually incline to the engineering background and practical ability,

encourage young teachers to study in enterprises, thus realizing the goal of cultivating innovative talents. [5]

### 3.5. Establish A Win-Win Cooperation Guarantee Mechanism For School-Enterprise Collaborative Innovation

Engineering education cannot be separated from school-enterprise cooperation. Therefore, the key to the implementation of engineering education is to establish a win-win cooperation and innovation guarantee mechanism between school and enterprise. In the aspect of joint talent training, due to the lack of deep mutual benefits between the two sides, the effect is not good and the long-term mechanism cannot be established. Collaborative innovation is expected to change this situation. To integrate the interests of government, enterprises, scientific research institutes and other parties through personnel training is the premise and foundation for the establishment of a long-term cooperation mechanism. With the improvement of the national infrastructure and the preferential policies of the local government, some IT enterprises can be attracted to settle down in local areas. Enterprises are also willing to establish cooperative relations with scientific research institutes and institutions of higher learning due to considerations of cost and brand effect. Local colleges and universities are important supporting forces for the development of regional economy and society. In order to promote the development of the local computer industry and promote the upgrading and transformation of other industries, local governments are taking the lead to take the training of computer professionals as the starting point to solve practical problems such as the shortage of computer talents in the region, to promote inter-school cooperation, school-institute cooperation, school-enterprise cooperation, to promote the deep integration of multi-stakeholders and to explore a long-term mechanism for collaborative innovation, which has become the inevitable trend of joint talent training between schools and enterprises.

### 3.6. Improve the Continuous Improvement of Teaching Quality and Guarantee Measures

Perfecting the continuous improvement of engineering education quality and the continuous improvement of safeguard measures is an important link of engineering education quality assurance, and is also one of the important goals of engineering education professional certification standards. In addition to establishing a sound education and teaching management system, it is an important part of ensuring the quality of engineering education that how to organically combine the internal quality control mechanism of talent cultivation with a credible third-party evaluation mechanism under the condition of making clear the continuous improvement of engineering education quality. Colleges and universities should set up special institutions and introduce professional talents, formulate continuous improvement and guarantee measures and detailed rules for the quality of engineering education from the aspects of engineering education concept, engineering education implementation and engineering education certification, and implement the whole process of training computer professionals. [6]

## 4. Conclusion

Carrying out the research on the certification of engineering education specialty is helpful to continuously optimize the personnel training system of computer science and technology specialty. This paper taking the opportunity of participating in the certification of engineering education major, further strengthens the research and reform of education and teaching, promotes the construction and development of computer science and technology major, and further explores the effective ways of personnel training and faculty construction, with a view to improving the competitiveness of information major and its talents in our school at home and abroad, now our computer major passed the national double-class professional evaluation. The completion of the construction and reform of the training system for computer professionals is of guiding significance to the training of application-oriented talents in this major.

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