Promoting the Construction of Computer Science and Technology Specialty at Local Universities through Professional Assessments

Yu-jian WANG, Qian GAO*, Wei-xiong TAN and Ming-ming WU
Smart City College, Beijing Union University, Beijing

*Corresponding author

Keywords: Professional assessment, Professional construction, Computer science and technology.

Abstract. In order to explore how to carry out professional construction through professional assessment in local colleges and universities, this paper puts forward a method of promoting professional construction with professional certification. The method elaborates from the aspects of the formulation and implementation of talent cultivation plan, the cultivation of professional core competence, the construction of modular curriculum, the establishment of multi-level practice teaching system according to the Beijing municipal colleges and universities undergraduate professional evaluation index system and computer science and technology professional positioning. Results show that the method provides a reference for the construction of computer science and technology in local colleges and universities.

Introduction

In order to implement the national long-term education reform and development plan, the Beijing Municipal Education Commission conducted a Professional assessment on computer science and technology, English and accounting in accordance with the requirements of the educational supervision committee of the State Council on organizing the pilot work of undergraduate professional assessment in regular colleges and universities in 2016[1].

Beijing professional assessment index system integrates the concept of engineering education professional certification[2], which refers to a professional certification or evaluation of higher education, and it’s an important means to improve the quality of professional education[3][4]. The major of computer science and technology in Beijing Union University is summarized from the aspects of talent training scheme and talent training characteristic, which promotes the reform of professional engineering education by participating the professional assessment of Beijing pilot[5][6].

Making and Implementing the Talent Training Program based on Professional Assessments

The professional assessment index system of undergraduate specialty in Beijing universities has given eight first-level indicators according to the standard of engineering education certification, among which the training objectives and training programs, curriculum system and training mode, graduation requirements and goals, quality assurance and continuous improvement and other indicators are related to the development and implementation of training programs [1]. We have made and perfected the talent training program according to the requirements of professional assessment in recent years. The training objectives meets the needs of the capital's economic and social development, and the implementation of the training program meets the requirements of the professional learning achievement in the assessment index system.

The Objective of Talent Training Meets the Capital's Economic Development

The society put forward different requirements for the talent training of computer science and technology due to the widespread application of computer technology. The professional assessment index requires the professionals meet the school orientation, adapt to the talent training objectives of
the economic and social development. According to the reform and development of Beijing Union University during the period of “13th Five-Year plan”, the school is based on Beijing, serves Beijing, Tianjin and Hebei, and trains the applied talents of highly qualified to meet the needs of economic development. We understand that the talent demand in this field has changed from the traditional computer application talent to the computer application, the Internet, the mobile Internet diversified technical talent through the online survey, social investigation and communication with the enterprise. Especially the relevant industries need a lot of mobile Internet application development talent with the rapid development of the Internet Plus and mobile Internet.

According to the school orientation and economic development needs, we face the professional orientation of capital IT industry to training the applied talents of highly qualified, around the computer application professional direction using modular classification talent training mode [7]. The students are mainly engaged in Web application development, embedded applications, mobile development, software testing and maintenance, multimedia design and other aspects of the work. In addition to cultivating the hardware and software development talent in the traditional sense, we focus on training the talents based on the Internet Plus, mobile Internet and other areas. We cooperate with Beijing University of Posts and Telecommunications by using the "double training" financial special and school matching funds. The cooperation aims to serve the needs of economic development in Beijing and train the big data talents urgently needed of society. In recent years, the graduates of professional training has a greater social competitive advantage in the IT field, the research data show that graduates employment position and income increase steadily and they can become the backbone of the enterprise after five years.

Making the Talent Training Program in Accordance with the Professional Assessment Requirements

According the results oriented theory of professional evaluation, the training objectives should be determined by the demand, and then the talent training program should be formulated according to the training objectives. When the training plan is formulated, the professional research work should be carried out according to the requirements of the school. We will analyze the orientation of the school, the change of social needs and the development trend of computer technology through the investigation of enterprises and similar schools. The school conducts training for professional heads, and specially invited experts from the Ministry of Education to guide. Finally, the professional formed a complete and standardized talent training program after years of construction.

With the development of computer science and technology and the change of the social needs, the professional assessment and revision of training objectives and training programs are conducted regularly. In accordance with the unified deployment of the school, the professional developed a new training program in 2011 and 2015. In 2013, the 2011 version of the training program was revised and forming the 2013 version of the training program for the implement of the Ministry of Education 2012 undergraduate professional directory. The school puts forward systematic requirements for the formulation of the overall talent training program when compiling the 2015 version of the training program. The school organization the professionals visit and learn the similar colleges and universities, required the implementation of the "modular" curriculum system and emphasized the ability of students to solve problems, innovation and engineering practice. The 2015 version of the training program credits totaling 165 credits, professional basic and professional courses accounted for 52.4%, including compulsory courses 20.6%, optional and elective courses 31.8%. Professional courses are designed to meet the needs of different students in a modular and hierarchical manner, reflecting the requirements of professional assessment.

We have developed a complete evaluation mechanism to fully absorb the views of the industry and graduates in the process of regular evaluation and revision of training programs for assessment the achievement of the professional training objectives. The professional establishment of more than 30 years has always been with the graduates and employers in close contact and always grasp the social demand for computer science and technology professionals.
The Implementation of Training Program Meets the Requirements of Professional Learning Outcomes

The characteristics of professional assessment in Beijing are student centered and comprehensive assessment the professional learning outcomes of students. Professional assessment index system in the notes gives the computer science and technology professional graduation requirements and learning outcomes must be completely covered twelve items. Graduation requirements are the concrete manifestation of the training objectives. In order to promote the achievement of the graduation requirements, the professional training objectives are decomposed into the following four sub-goals: the basic knowledge is solid, the practical ability is strong, the unity of knowledge and practice; the ability to adapt to different positions and sustainable development; the ability to solving practical problems in the field of IT; engaged in application development, testing and maintenance, design, technical support and information services and other aspects of the work. The ten graduation requirements for professional development have been formulated according to the training objectives of decomposition, and the ten graduation requirements to support the four decompositions of the training objectives. In addition, the correspondence between the ten graduation requirements set by the professional and the twelve items of the index system notes is clear. The ten graduation requirements of the professional were index points decomposition, each graduation requirements corresponding to a number of decomposition indicators, the decomposition of the index point is standard and it can reflect the characteristics of students' professional learning outcomes.

The course rate and teaching effect meet the requirements of professional learning outcomes. And the 67 courses meet the requirements of professional learning outcomes. In order to ensure the teaching effect to meet the requirements of professional learning achievement, each semester organizes experts to carry out quality evaluation and focuses on the evaluation of the main courses corresponding to the requirements of professional learning outcomes according to the curriculum system support for graduation requirement. The professional heads in charge to explain the training requirements of the specific implementation plan to professional teachers through teaching activities and regular work, and let the students have a basic understanding of the four-year curriculum plan using the opportunities of the new students enter the school. Class tutors are held by professional teachers, which can help students achieve the requirements of satisfying professional learning achievements.

With Professional Assessment to Promote the Construction and Highlight the Characteristics of Personnel Training

Professional assessment index system in the notes stressed that graduation requirements can reflect the professional characteristics [1]. Local institutions of higher learning have a natural connection with local social and economic development [8][9]. And the professional assessment index system can be based on social and economic development needs to determine the basis of personnel training, highlighting their own local professional characteristics. We make full use of the capital IT services industry development needs of talent, through participation in professional assessment work, carefully combing the personnel training mechanism and curriculum system and other aspects of the problem, highlighting the computer science and technology professionals training characteristics.

The Establishment of Cross-type, Multi-level and Multi-type Professional Core Competence Training System

In the student-oriented education philosophy under the guidance of professional personnel training model reform [10], to train students' professional core competencies. Focus on training students' computer applications, Web application development, embedded system development, network application development, multimedia information processing and other professional core competencies. The design of course content should clarify professional core competencies and professional basic skills requirements, embodied in the modular curriculum design. To clarify the
supporting structure of each course on the goal of personnel training and the logical structure of the
link between the courses, the formation of professional curriculum map to help students according to
their academic development goals for academic planning and selection of curriculum modules to
improve students' ability to self-learning.

The school develops teaching materials focus on the professional core competence training to be
included in the school planning materials to be funded, and to encourage the declaration of national
planning materials and boutique textbooks. In recent years, the professional planning materials more
than 20 topics, of which the school-level quality teaching materials and planning more than 10
teaching materials, municipal boutique textbooks 7, 6 national planning materials.

**Set up a Modular Course System**

In order to meet the needs of students diversified, fully consider the characteristics of students, to
adopt classification training and hierarchical teaching methods. In accordance with the engineering
education professional certification standards, reference industry standards, application-oriented, and
then the curriculum system reform, the formation of their own professional characteristics. Break
through the traditional disciplines as the center model, according to social needs, student ability and
interest, around the computer application professional direction using modular classification talent
training mode. And enterprises, industry cooperation, the establishment of application-oriented and
industry-based modular curriculum system.

Computer science and technology major compulsory courses are basically the same. But because of
the new science and technology of science and technology continue to appear, which resulting in a
wide range of professional courses. According to the needs of social talents and the development of
computer science and technology, we will sort out the existing specialized courses, optimize the
curriculum system and teaching content, and construct the modular curriculum system for the IT
service industry. Different modules, different courses cross-combination, the design of multi-level
and multi-type modular curriculum system, including Web application development, system
operation and maintenance, embedded applications, multimedia technology and other modules.
Modular curriculum set to cultivate students' professional core competence for the purpose, pay
attention to the combination of engineering practice, consolidate, expand, apply the knowledge,
 enhance the overall quality of students. Implementation of the "1 +2 + 1" teaching model, from the 6th
semester to start modular courses. For some courses set ABC different levels for different students to
choose the foundation.

**The Establishment of Multi - level Practice Teaching System**

Computer science and technology professional assessment index system requires graduates to solve
complex problems, but also to assess solutions to the complex issues of environmental and social
sustainable development. Own professional actively explore the practice of teaching reform, the
establishment of multi-level practice teaching system. The practice teaching system is composed of
practice teaching links, platform, implementation methods and others. The practice teaching system is
a multi-level and multi-link practical teaching system covering curriculum experiment, curriculum
design, professional practice, graduation practice, graduation design and others. Practical teaching
credits totaling 67 credits, accounting for 40.6% of the total credits, in line with the Ministry of
Education on the undergraduate practice teaching requirements. Follow the practice of teaching four
years of continuous line of goals, the use of diverse teaching methods. In the first year of college,
dispersion and centralization combined with the way to complete, so that students better understand
the professional. In the sophomore year and the third grade, take the way that curricular,
extra-curricular and openness, students can be based on personal learning and time to complete the
engineering training. In the fourth grade, take the school, outside the combination of ways, through
the school and enterprise co-cultivation, double tutor system to complete the enterprise internship
links and cross-guided graduation design.
Employ industry experts with practical work experience to do part-time teachers in the school, and they will give students the experience of project development to students and improve their ability to solve engineering problems. We and Tedu group co carried out long-term school-enterprise cooperation, and the course and professional practice between the replacement. For example, we will take professional elective courses "online game development" and so on as a cooperative course with Tedu, and also hired Tedu professional lecturers. Through the cooperation of production and research, the establishment of a number of off-campus personnel training base, students through the practice in the base to complete professional practice, to participate in training certification and obtain the mainstream industry certification.

Summary

Computer science and technology professional school level to diversify, local colleges and universities computer science and technology professionals need to accurately grasp their professional positioning. We participate in the Beijing professional pilot assessment, focusing on the development and implementation of personnel training programs, to cultivate their own professional characteristics of two aspects of professional construction and reform. In order to meet the requirements of professional assessment as soon as possible, we earnestly study and understand the professional evaluation index system, the basic assessment of the basic requirements and evaluation criteria to identify gaps and continuous improvement. Through the adoption of classification training, hierarchical teaching methods, we design multi-level and multi-type modular courses according to the needs of social talents. Professional construction level has been effectively improved, nearly 3 years of the professional school assessment results are A, comprehensive ranking steadily.

Acknowledgement

This research was financially supported by the school education science research topic of Beijing Union University in 2017(Sk30201709).

References
