Cultivation Mode of Computer Engineering Postgraduate in the New Era of Big Data

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Abstract
In this paper, the influence from the new era of big data in computer education was discussed firstly. It gave the specific cultivation mode of computer engineering postgraduates based on the research on different cultivation aims and characteristics between engineering postgraduates and academic postgraduates. It explored the new approach and strategy on the innovative talent training in the engineering postgraduates so as to adapt to the request of enterprises and new technology trends.

Keywords
Cultivation Mode; Engineering Postgraduate; Big Data

Introduction
At present, enterprises badly need composite and innovative talents who can integrate theory with practice and those who can be relied on to capture the market and to gain competitive products. But the reality is, on the one hand, though the part of the graduate students educated by universities master the profound theoretical knowledge, but they lack of the systematic practical experience. Therefore, it is difficult for them to find an appropriate job. On the other hand, as for the enterprise internal personnel, though they have the actual operation ability, they lack new theories and new knowledge of the related technologies and products. Postgraduate education in colleges and universities as a unit, therefore, need to explore how to set up many kinds of mode of talent training system according to the enterprise development needs and talent development needs, so that the computer technology and engineering graduate student can be more personalized.

Computer technology is the technology discipline with practical, systematic, and cross discipline nature and the era characteristics. The education of computer technology and engineering postgraduate students are required to develop postgraduate students’ professional ability to find problems, to analyze problems and to solve problems according to the three forms of computer science: abstract, theory and design. Computer technology engineering graduate students should have innovative thinking and engineering thinking, and acquire the appreciation ability of the theory and can practice from the perspective of system, and have the rich engineering experience and a good ability to adapt to various jobs (B. Zhang and Y. Ge, 2010).

Therefore, it is urgent to improve the quality education of computer technology postgraduate engineering student's innovative thinking, innovative experiments and research and development ability which will enable the postgraduate students better meet the needs of enterprise technology innovation. The colleges and universities need to actively guide industry, enterprises and social forces to participate in the engineering postgraduate student education. In order to establish a training system with diversified demands that meet the needs of the computer industry, and to explore new modes and methods of the training scheme, course system, teachers team, and the base of teaching practice and other various aspects.

Influence from the New Era of Big Data

New Cognitive Mode of Computational Thinking
Computational thinking, figuratively speaking is to think problem like a computer scientist. Computational thinking is a scientific method which uses the basic concepts of computer science to solve problems, design system, and understand human behavior (Jeannette M. Wing, 2006). Computational thinking is characterized by design and construction. It is a series of thinking activity which covers the field of computer science. Its core essence is abstract and automation which is the world’s most basic mode of
thinking.

With the coming of the era of big data, computational thinking will be the same as mathematics, physics thinking, and become one of the most basic human thinking ways. The cultivation of computational thinking ability will become the important part of computer teaching, especially the foundation teaching.

To develop computational thinking ability which is the core of computer basic teaching task, it not only contains the fundamental task of computer basis teaching and the existing core knowledge content as well as a reflection of the nature of computer science, but also reflects the characteristics of university foundation education, that is the more emphasis on the training of thinking method.

**Five Integrated Mode and Operation Mechanism**

The cooperation of government, industry, university, institute and user is one of the important measures to cultivate innovative talents. The key is to build a long-term mechanism of university-enterprise cooperation. Solution of the problem is to expand with the combination of innovative talents cultivation model, agencies of the government, enterprises, universities, research institutes and units of choosing and employing persons with the combination of five integration of innovative talent training mode (W.L. Wan and J. Fan, 2012). This pattern is played with a combination model of the role of the market “the invisible hand”, and is given full play to the government- "the visible hand"- in multilateral cooperation, to strengthen guidance and coordination, build stable cooperation relations and establish the stability of the talent training base. A good environment for using combination, to form complementary advantages, mutual benefits, win-win development between enterprise and college or university is built through government policy, and then to form professional characteristics and the professional advantages.

**Influence from Open Course Resources**

At present, Internet is filled with vast amounts of teaching resources. In addition to the policy guidance of all kinds of high quality courses, various kinds of network institutes are providing distance education resources, including the teaching video and other courseware. Meanwhile many schools has already established their open teaching resource on the teaching websites.

Open course is not to get a degree as the only one goal, it makes full use of the online video of remote teaching, and provides e-learning platform for any interested parties, breakthroughs of the limitation of the geographical space and time, and returns to the nature of learning. With social networks, learning and discussion can be implemented at anytime and anywhere. Today the open course has become a useful supplement to traditional education and caused shocks in universities. As for the influence of the open courses, online courses have become an important supplement to many universities which can be used to raise the teaching level and get more reputation of the school activities.

**New Demand for Data Engineer**

The basic requirement for graduates majored in computer will be changed in big data era. Graduates majored in computer will face challenges from cross-dispines. Computer professionals will not only be programmers, but should be geared to the needs of big data computing thinking and cognitive ability, and can grasp the method of big data analytics, mining tools and development environments. They must have interdisciplinary knowledge and learning ability, and able to work closely with experts and scholars from different areas. The data expert committee of CCF predicted that there will be a lot of demands for “data engineer” and other popular and new type of computer talents after 2013 (Big Data Expert Committee of CCF, 2012).

**New Way of Social Network and Mobile Internet**

The popularity of new social networking Medias including Blog, QQ, etc. further promote the socialization of mutual learning and extend classroom discussion to the network (Agichtein E., Castillo C., Donato D., Gionis A. and Mishne G., 2008). Unlimited time and space of open learning will build a new type of active teaching environment, and will change the common passive learning situation of traditional classroom teaching. Teaching activities will break through the boundaries of the campus and the participants of teaching will not only be limited to teachers and students.

**Cultivation Mode of Computer Engineering Postgraduate**

**Cultivation Mode Based on Actual Project**

Since the highly unified characteristics of professional
degree of engineering and academic, the dissertation topic of computer technology and engineering postgraduate student should be from the practical engineering. In the process of the cultivation of engineering postgraduates, on the one hand, it should avoid simply setting the tendency of all engineering graduate student training process by the specific application project development; On the other hand, engineering postgraduate student (especially full-time master of engineering postgraduate students) training should pay special attention to the principle of combining theory with practice, by relying on the guidance teacher’s research topics for dissertation topics, and should pay attention to the systematic and normative training of project development process so as to ensure the integrity of engineering postgraduate students’ practical skills and practice ability.

In the practice of cultivating engineering master graduate student, the implementation based on actual development project will face two basic problems, namely, how to form suitable project for training of engineering postgraduate students and how to ensure the implementation effect of the actual development. To this end, the actual development projects were divided into two categories: from the actual development of the enterprise technical problems subject and from university teachers who undertake the actual development of the subject research and development projects, each type of actual development project using different formations and guarantee mechanism.

In fact, the enterprises have many technical problems which need to be studied and solved, but their lack of technical strength make them facing many uncertain factors. It is an effective way to solve technical problems by the joint training of universities and enterprises for postgraduate students. Particularly, the way is as follows; according to the long-term technology development plan, the enterprise put forward technical requirements and set some technical problems in the form of project into several research topics. Each subject, jointly organized by the universities and enterprises, is arranged several part-time engineering graduate students from this enterprise, as well as full-time master of engineering graduate students from the universities and engineering master’s research. The key job of engineering masters are to solve the theory problems and engineering postgraduate students of full-time system and non-full-time system to solve the technical problems and engineering problems. Non-full-time master of engineering postgraduates is to complete a practical project, rich their theory knowledge, strengthen their professional skills, and their ability to solve actual problems; Full-time master of engineering graduates is to complete a practical project, consolidate theory knowledge, be familiar with the actual engineering and exercise practice ability; Engineering master students is to complete a practical project, meet the actual project and enhance the ability of theory with practice.

There are also many technical problems need to be solved when universities and colleges teachers undertake significant research projects and application development projects. These problems should be settled through the whole process of the cultivation of engineering postgraduates so as to ensure the quality of the cultivation of engineering postgraduates. Thus it puts forward the questions that how to standardize the knowledge system and the ability structure, how to form the common practice of supporting system, how to close to the needs of enterprises, how to cultivate the engineering development ability and so on. Through summarizing the practical practices for many years, there are two kinds of measures to solve these problems: one is to establish various forms of training bases and provide a variety of hardware and software support environment and organization management system for engineering development and application technology development requirements; another is to invite the computer companies to participate in the cultivation organization of postgraduates, and to carry out the implementation, management and evaluation of the whole process of talents cultivation with the support of computer enterprises’ management practices and reference to corresponding computer enterprises’ development specification.

Adjustment Teaching Plan and Course Content

The big data research is a kind of interdisciplinary research. Therefore, to restructure the existing computer courses or increase interdisciplinary courses becomes more important. Current computer education needs to increase interdisciplinary courses while strengthening basic courses education (B.A. Li, 2012). Students wish to have interdisciplinary knowledge and learning ability of new technology. It is a challenge how to embody the characteristics of the cross subjects, and how to train the specialists in the field of big data (N. Su, S.J. Chen, 2008). Computer
industry is evolved into real information industry, from the pursuit of computing speed to focus on big data processing ability; the software will also change from mainly programming to data-centric.

Facing with the current trend, computer educators should gradually increase data of the teaching content and experimental design in the teaching process. Computer science is a practical strong discipline, and it is a key link for computer education of big data era, to strengthen practice link and set up big data teaching experimental environment in the process of computer professional talent training. Computer educators should carry out more course experiments, course design, extracurricular activities of science and technology practice, so as to expand the scope of practice, strengthen practice and try to reform practice mode.

Conclusions

The cultivation of the computer technology and engineering postgraduate students should be in accordance with the social needs, and strengthen vocational guidance which should be in close connection with the development of computer science talent demands and the new technology trends so as to make innovation training mode focus on the characteristics of computer industry and the characteristics of cultivate unit itself. In the training objectives, curriculum setting, teaching concept, teaching staff, quality standards, etc, shall establish specific cultivation mode which is significantly different from academic postgraduate students.

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