

Available online at www.sciencedirect.com**SciVerse ScienceDirect**

IERI Procedia 2 (2012) 161 – 166

Procedia
IERIwww.elsevier.com/locate/procedia

2012 International Conference on Future Computer Supported Education

Research on the Innovation of Training Mode for Professional Personnel of Computer

Yun-yang Yan^{a,*}, Quan-yin Zhu^a, a*^a*Faculty of Computer Engineering, Huaiyin Institute of Technology, Huaian, 223003, China*

Abstract

The innovation of training model for professional personnel of computer for application universities is introduced in this paper. The measures for how to implement the innovation of training model for professional personnel of computer are proposed in detailed. Practice demonstrates that the proposed model and measures obtained excellent effect and the quality of professional personnel trained by this way have been increased.

© 2012 Published by Elsevier B.V. Open access under [CC BY-NC-ND license](http://creativecommons.org/licenses/by-nc-nd/4.0/).

Selection and peer review under responsibility of Information Engineering Research Institute

Keywords: Computer professional, training model, engineering education, cooperation between school and enterprise

1. Introduction

Computer a professional in China from the late 1950s, Ministry of Education on the undergraduate course catalog was organize and adjusted in 1998. The professional name of the computer class reserved only one name that is the Computer Science and Technology. Due to the rapid development of information technology, the computer professional have rapid development fast. That opened a variety of professionals, not only in Computer Science and Technology professional direction, and also set up a directory outside professionals.

* Corresponding author. Tel.: +86-139-52366608; fax: +86-517-83591163

E-mail address: yunyang@hyit.edu.cn

For example, software engineering, network engineering, computer software, Internet of Things engineering, digital media arts etc.

Colleges and universities more than 85 percent of the school opened a computer professional in China's, and it is the first national professional points. This shows that in order to achieve the goal of speed up the process of information, use IT to propel industrialization. The communities need the professionals with strong demand. It shows the tremendous competitiveness and pressure of the professional educational and employment as well. This requires the professional to be able to unique, to better obtain the requirements of the communities.

However, the computer class graduates in employment increased gradually the difficulty in recent years. The main reason is that there is a large gap between the universities computer training class talent with the requirements of the communities. So, in order to promote the transformation of the university computer class professional development and training high-level applied talents, the training models for computer class professional need to be reform. The training model reform program for the computer professionals is discussed in this paper. The implementation methods and the results of training model for Computer Science and Technology Application Personnel of Huaiyin Institute of Technology is introduced.

2. Multi-modal Integration of Personnel Training

Over the years, the computer professional teaching emphasizes discipline, and focus on imparting knowledge. With the popularization and application of IT, society needs to have certain professional characteristics and the specific capacity of the computer application personnel. Therefore, the computer professional personnel training should follow the engineering education thinking. That is employment-oriented, culture-based ability, and takes the way of combining production with research development. The students not only need to master basic computer theory, information processing technology, but also need to have the abilities of the system development and applications, and to hold the basic training of engineers, to train students to grasp new technologies, new methods, with a strong sense of innovation and so on.

In recent years, the culture of the computer professionals for engineering education, there are some new training models such as “3+1”, “School-enterprise Cooperation”, “Chinese-Foreign Cooperation”, and “Sub-level Engineering Training”. For “3 +1” pattern, that is in a four-year university system, the first three years learning the basic theories and basic experimental skills, the final year of internship, training their development capabilities and expertise. For School-enterprise Cooperation model, which is training, professional practice, and other aspects of the teaching is organized and completed by the school of professional teachers and corporate engineers. For Chinese-Foreign Cooperation model, that is in order to adapt the software outsourcing and international demand for qualified personnel, in cooperation with foreign universities or educational institutions, the introduction of foreign curriculum system and teaching model are used, the foreign textbooks and bilingual teaching are used as well. For Sub-level Engineering Training model that is practical training from basic to the ability of the training process, classification, and optimization. The three-layer structure is formation of knowledge learning and application of capacity-building, and the end of engineering training.

Based on these training models, the quality of personnel training significantly improved, but these patterns are still some limitations. For example, “3+1” model, the teacher quality, quantity and experimental conditions for practicing and training should be higher requirements in the last year, the commonly school is difficult to fully meet. For School-enterprise Cooperation model, training time is short, and did not enter the actual operating environment, and focus on simulation of the topical application needs, so the capacity-building is not comprehensive enough. For Chinese-Foreign Cooperation model, although the introduction of the curriculum are fetch in, but most of the courses still teaching by the school teachers, so it can not fully

comprehend supporting the teaching mode and teaching methods, such as the use of English textbooks, students need to spend a lot of effort to understand English, and affect learning time, so it reduce the learning effect. For Chinese-Foreign Cooperation model, students early learning in the own country, and the latter continue to study abroad, the two schools mutual recognition of credits. Although it can refer to the foreign school system too, but the students' economic burden, and the effect is not higher on learn the foreign experience in education.

In order to cultivate high-quality personnel in the new era, personnel training should integrate a variety of training models. In the process of implementation of the "3+1" model to strengthen the cooperation with enterprises, the implementation of the colleges and universities with well-known enterprise cooperation in running schools, not only the introduction of enterprise training system, enterprise their own teaching materials, but also teaching practical courses and part of the practice should be practicing engineers. The school teachers only as a teaching assistant, the enterprise model should be come into the classroom. Bridging the gap between the personnel training and social is needed. Under the conditions permitted, carry out substantive cooperation in the universities, it is not only teaching cooperation with renowned overseas universities, but also to strengthen academic exchanges. Through the cooperative education, effectively improve teachers' teaching philosophy, and to expand academic exchange channels. The new training model should be through theoretical teaching, experimental teaching, on-campus practical training, off-campus internship, and the way of school-enterprise alliance project training and so on. That is the gradually form a hierarchical advanced engineering education personnel training model.

3. Reform-measures for Personnel Training Model

3.1. Consummate Personnel Training Scheme

Personnel training scheme should be optimized depend on the community-oriented requirements. Build the curriculum system according to the requirements of disciplines of knowledge and applications. Form of curriculum group accordance with the correlation of the course content. Creation of different professional direction according to the demand for talent, training professional personnel in the guarantee based on the premise. Curriculum theory, experiments, practical aspects of the arrangements to meet the engineering education requirements, personnel training needs to ensure that the basic theory of learning and continuous, continuous of engineering training and experimental skills training, programming, training. Class teaching should be finished previous three years and the final year focus on professional skills and professional ability training.

According to the environmental requirements of the computer software talent internationalization and software outsourcing market, further improve the knowledge, ability and overall quality of both the applied personnel training program. Foreign advanced teaching system should be imported and absorbing. Comprehensive training by project-driven implementation, "3+1" pattern should be improved, and the School-enterprise Cooperation training scheme should be further implementation.

3.2. Enhance the Curriculum Construct

Computer professional courses should be designed to reflect the idea of capacity-based, reflecting the overall quality of education as the core of professional quality, and throughout the whole process of education and teaching. Teaching system should fully reflect the eligibility requirements of the occupational status to apply thrust to build the teaching contents and curriculum system; teaching of basic theories to apply for the purpose "must be enough for the degree; professional teaching to enhance the relevance and practicality,

teaching content organization and financial arrangements for imparting knowledge, ability, quality education, for professional training objectives, curriculum construction.

Theoretical teaching system should be weaken the disciplinary nature of the curriculum, to strengthen the accumulation of knowledge, application and novelty, prominent the basic teaching characteristics of professional application and must be enough for the requirements. In curriculum reform, the requirements for professional development should be applied to strengthen and curriculum practices should be integrated.

3.3. Excellent Teaching Materials should be selected

As computer technology has developed rapidly, generally published teaching materials are difficult to reflect the latest technological achievements. Nearly three years of publishing award-winning teaching materials and planning materials should be used. Applied textbooks of undergraduate institutions should also be targeted at capacity-building, the emphasis on practice and practical, the original materials may be appropriate to use and the organization of teachers actively to the preparation of teaching materials or handouts.

3.4. Teaching Conditions Should be Upgraded

Computer professional should strengthen the application of ability, this should enhance the construction of laboratories, training bases and teaching conditions, emphasizing the concept of engineering education to improve teaching and learning models, increase the hardware environment while building, focusing on the construction of soft environment, improve building-level to provide students with good practice training conditions. Laboratory construction focus to meet the curriculum group practice, training, innovation and practice training requirements, training students project development capacity, practical ability, sense of innovation, taking into account the teachers' research needs, to train teachers of engineering quality in order to guide students better.

Strengthen School-enterprise Cooperation and integration of enterprise business processes, policies, industry expertise, and many other advantages. Simulated business platform should be created for students training on the corporate culture, professionalism training, IT skills training, and business process practice and so on. Teaching resources should be strengthened construction to achieve teaching resources of digital, networked, and to help the students learning independent by themselves.

3.5. Engineering Quality of Teachers Should be Improved

Education is to last for generations, and the teacher is to last for education. Universities are the cradle of the personnel training, the key of personnel training is the overall quality of teachers. Teachers' qualities determine the level in the personnel training. Engineering quality of the teachers should strengthen. Teachers should be organized to enterprises to participate in the development of computer application technology activities and production practices. Teachers' level of scientific research and application can be promoted by industry-study-research cooperation. By this way, the teachers can enhance their research level and application abilities, promote the teaching work; improve scientific research and the teaching level.

In the faculty building, both the introduction and training should be used. The teacher level and the arrangement can be progressed. The training, introduction and using should be firmly grasped. For a good environment of teaching staff, a fair, equitable, competitive, cooperative, excel the environment should be done. The construction of teachers should be emphasized that the collective power play team advantages;

strive to create the work of stage, to protect the teacher stable; strive to create the atmosphere of strengthen excel awareness; strengthen academic exchanges, and build a relaxed academic environment.

4. Reform Practice and Effect on the Proposed Personnel Training Model

In the computer science and technology professional process in our university, we explore continuously and gradual implement personnel training mode reform. According to the needs of the communities and professional characteristics, Information Security, Software Engineering, Network Engineering, Embedded Systems Software Design and other professional directions have been set up.

4.1. Composing the Curriculum System

The "Platform + module" model is used to build the curriculum. The five platforms of general course, subject foundation curriculum, specialized courses, practical ability training and capacity expansion are constructed. IT, information security and software engineering curriculum modules are intercalated. The students according to their interest in learning as well as the market for talent need to select the learning modules. Teaching process ensure that the basic theory of learning and application should be continued. The engineering training and experimental skills training and programming training should be continuous continued too. Implement the ideology of engineering education, All the new models of the "3+1" pattern, the School-enterprise Cooperation, Chinese-Foreign Cooperation model and Sub-level Engineering Training model new teaching model are gradual implemented. For example, Cooperation with Microsoft, an embedded part of Microsoft courses and the courses were taught by business experts on the school. At the end, the comprehensive quality of the students' software development capability has been significantly improved.

4.2. Enhance Construction of Teaching Resource

Strengthen the construction of teaching resources from the software and hardware to improve the teaching conditions. Experimental teaching demonstration center of Jiangsu Province was built in computer engineering experimental center. Strengthen research governance and local governments and enterprises, the Construction Software Testing and Technical Public Service Platform of Jiangsu province, the Information Technology Key Laboratory of Huai'an city, Things Key Laboratory of Technology Research and Application of Huai'an city, ERP Experiment Center of Huai'an city, Information Security and Confidentiality Engineering Research Center of Huai'an City and Things Industrial Applications Engineering Technology Research Center of Huai'an city, all of those support the professional teaching and training.

4.3. Implementation Effect

The past three years, students have published 26 papers, 10 software copyrights, 3 of provincial outstanding graduate design, 35 innovative students' projects which including 8 provincial projects. 103 students won above the level competitions reward which including 30 provincial and ministerial level encourages and rewards. More than 40 percent of the graduation project comes from the production practice, about 30 percent comes from research projects and more than 90 percent of the annual topic update rate. Students' employment rate more than 99 percent, the quality of employment is very good, and the employer gave a high evaluation on our graduated students. Training model reform not only improves the quality of teachers, but also progress the teachers of scientific research and technology development capacity. 16 research awards and 22 teaching achievement awards were gained by the teachers.

Both the uniformity and standardization of undergraduate basic platform were ensured by the multi-directional personnel training programs, at the same time, the graduates employability and competitiveness and job adaptation in accordance with the technical characteristics of the industry positions were pledged by the enrollment of professional orientation and training. By this way, the students to continue further studies were taking into account as well. Graduate follow-up survey results show that such programs meet the requirements of the community. The research project of the Study and Practice on Multi-models Personnel Training for Local Engineering Universities gained the Educational Achievement Award of Jiangsu Province.

5. Conclusion

Computer professional personnel training reforms needs to further cultivate. Depend on the talents of the application requirements, the curriculum system need to be further reflecting the idea of capacity-based. The overall quality of education as the core of professional, quality, and throughout the education and teaching process should be researched continue. Teaching system should fully reflect the occupational status eligibility requirements, applications for the subject teaching of professional courses to enhance the relevance and usefulness of the teaching of basic theories for the purpose of application. With the must and enough for the degree, the intensity of practice teaching should be increased. The course content organization and arrangement of financial knowledge, ability, and quality education should be as an entia. The professional training objectives, the necessary curriculum integration, and implementing case teaching, task-driven, project implementation of educational reform ideas should be integrated. In short, the purpose of reform should be to enable students with a strong ability, not only employment smoothly, but also has some potential for further development.

Acknowledgements

Thanks the help of Zhao Jianyang , Chen Hongming and Staff of Faculty of Computer Engineering in HYIT.

References

- [1] Liao Xisheng, Liao Yuechun. Research on Training Mode for Professional Personnel of Computer Science and Technology [J], Computer Education, 2009(18):32-34.
- [2] The Teaching Guidance Committee of Computer Science and Technology in a College under the Ministry of Education of China. The Curriculum and Public Core Knowledge for Computer Science and Technology in a College [M]. Tsinghua University Press, Beijing,2008
- [3] The Teaching Guidance Committee of Computer Science and Technology in a College under the Ministry of Education of China. The Practice Training System and Standard for Computer Science and Technology in a College [M]. Tsinghua University Press, Beijing,2008
- [4] GUO Youqiang, DONG Yi. Study in Personnel Training Mode of Computer Major for New Local Undergraduate Colleges[J], Computer Education, 2009(16):87-90