Construction of Practical Teaching Quality Assurance System for Computer Talents in Applied Universities

Fengping Cao[a,*], Xiangju Li[b], Zhu Lin[c]

Department of Electronics and Computer Engineering, Southeast University Chengxian College, Nanjing, Jiangsu, China

[a]54346096@qq.com, [b]215142863@qq.com, [c]21788194@qq.com

*Corresponding author

Keywords: Layered Progressive, Practical Teaching, Talent Training, Quality Assurance System

Abstract: Computer majors have strong requirements for practice, but in the training of practical ability of computer talents in application-oriented universities, there are some problems, such as unclear curriculum objectives, insufficient ability focus, loose functional connection, and unrealistic practical projects, and the quality of practical teaching cannot be guaranteed. Based on the current situation, a quality assurance system for practical ability training with comprehensive design ability as the main line, spiral advancement, continuous optimization, and seamless connection with the needs of industry enterprises is established. To ensure the interlocking of practical teaching and promote the virtuous circle of practical teaching.

1. Introduction

With the rapid development of IT technology, the IT industry has put forward new requirements for the cultivation of applied undergraduate talents, and the requirements for practical ability are higher. However, there are many problems in the training of practical ability in colleges and universities that mainly train applied talents, such as unclear curriculum objectives, insufficient ability focus, loose functional connection, unrealistic practical projects, and few platform carriers[1-4]. Therefore, the computer engineering department of Chengxian College of Southeast University takes the industry demand as the guidance, takes the ability model design as the breakthrough point, takes the deep cooperation between schools and enterprises as the breakthrough point, reverses the drive, focuses on the application, and constructs the computer comprehensive application ability as the main line, spiral advancement, continuous optimization, and seamless connection with the needs of industry enterprises. The training system of computer practical ability in applied colleges and universities ensures the quality of practical teaching.

2. The construction goal of practical teaching guarantee system for computer majors

Focusing on the ' training of applied talents as the goal, taking the needs of enterprises as the guidance, taking the cultivation of practical ability as the core, integrating the knowledge system of computer practical courses, and constructing a practical ability training system of on-campus and off-campus, in-class and out-of-class, sustainable improvement and hierarchy ', this concept of practical ability training for computer majors constructs a reverse-driven and spiral-progressive practical ability training system for computer talents in applied universities to solve the following problems[1-4] :

---The problem of diversified training path planning for applied talents.

---The problem of poor correlation between independent courses in each practical course.

---How to create a hierarchical progressive training system for sustainable improvement of practical ability.

---How to give full play to students ' independent innovation ability

  DOI: 10.25236/ehmit.2023.021

3. Construction of practical teaching quality assurance system for computer majors

With reverse drive as the motivation of reform, model construction and project design are carried out, and the information feedback mechanism of school-enterprise cooperation is established, and finally the system is formed[1-4].

- Reverse drive. From the ten years of in-depth school-enterprise cooperation in various ways, we have continuously captured the weak links in school training and the weak points of students ' practical ability and quality, and used this as the motivation and thrust of the continuous reform of the practical ability training system.
- Model construction. Based on the feedback of enterprises and employers on students ' practical ability, starting from the system comprehensive design ability that applied undergraduate computer graduates should have, a ' hierarchical and progressive ' practical ability training model was established. As shown in figure 2, it covers the whole process of ' basic cognition and program design ability → system cognition and algorithm design ability → computer application ability → IT industry engineering application ability → comprehensive and sustainable innovation ability ', and gradually cultivates the ability to solve the practical problems faced by enterprise computer application from bottom to top.
- Project design. Focusing on the comprehensive design ability that graduates should have, the top-level application-oriented project with certain difficulty is designed, and its knowledge decomposition and target refinement are carried out. From top to bottom, a detailed correlation analysis is carried out on the relevant eight practical courses, considering the connection of knowledge points within the course and the relationship with the prerequisite course and the follow-up course. The results of the prerequisite course should be used as the basic components or technical support of the follow-up practice course as much as possible. The content is superimposed layer by layer, and the ability is spirally advanced, and gradually improved until the final top-level application project is completed. Enable students to initially have the ability to analyze and design real systems.
- Mechanism construction. Explore the establishment of school-enterprise cooperation information feedback mechanism, practical ability training system, and promote the ' theory and practice ', ' in-class and out-of-class ', ' on-campus and off-campus ' three levels of circulation.
- System formation. Finally, a practical ability training system for computer talents in independent colleges with the characteristics of ' spiral advancement, top-down, bottom-up, and circular closure ' is established. Horizontally, a progressive in-class practical teaching content advanced system of course experiment- > course design- > in-school research- > off-campus training has been formed, and the five-layer spiral advanced practical ability training goal has been realized vertically.

4. The construction measures of practical teaching quality assurance system for computer specialty

In order to ensure the quality of practical teaching of computer majors, the secondary colleges have carried out corresponding work from the aspects of training system reform, practical model creation, practical ability training system establishment, and practical teaching system reconstruction.

4.1. School-enterprise cooperation reverse drive the reform of practical ability training system in school.

We have developed off-campus resources, practiced a variety of school-enterprise cooperation models, established a long-term and stable off-campus internship base, and formulated a matching internship plan and internship outline ; establish an information feedback mechanism for school-enterprise cooperation, and on this basis, find out the weaknesses of the practical teaching links in the school, so as to carry out an overall reform of the practical ability training system and teaching content in the school.

4.2. Create a ' hierarchical progressive ' practical ability training model

The practical ability training requirements in the talent training program are layered to create a ' layered progressive ' practical ability training model. In the spiral advanced way, we gradually cultivate the ability to solve the practical problems faced by enterprise computer application, and reflect the practical ability training requirements of applied computer talents. The five-layer model covers the whole process of ' basic cognition and programming ability → system cognition and algorithm design ability → computer application ability → IT industry engineering application ability → comprehensive and sustainable innovation ability '. The training objectives of each part are as follows :

- Basic cognition and programming ability

The cultivation of basic cognition and programming ability includes : the construction of software development platform, basic programming process and skills, simple data / symbol representation and processing and problem model representation, small program design and implementation.

- System cognition and algorithm design ability

The training of system cognition and algorithm design ability includes : understanding computer hardware from a software perspective, using and configuring basic system software, designing and analyzing simple algorithms, and basic system capabilities.

- Computer application ability

The cultivation of computer application ability includes : re-understanding of system-level programs and algorithms, application of computer network systems, selection and configuration of database products, design and implementation of applications, design and application of software system performance, development of database application systems, etc.

- IT industry engineering application ability

The cultivation of engineering application ability in IT industry mainly includes : formulating enterprise application solution, design and implementation of large-scale program, configuration, integration and development of e-commerce software, algorithm analysis and design of a certain scale.

- Comprehensive and innovative ability

Comprehensive and innovative capabilities mainly include : problem abstract modeling, abstract representation and processing, design and optimization of large-scale programs, formulation of overall solutions for project front-end, and formulation of overall solutions for system development.

4.3. Design ' reverse drive, spiral advanced ' practical ability training system

The practical ability training system of ' reverse drive and spiral progression ' is designed, as shown in Figure 1.This system runs through the whole process of talent training for computer talents in independent colleges[5-9].

Reverse drive : based on the feedback of enterprises and employers on students ' practical ability, drive the reform of practical ability training system.

Spiral progression : It is mainly reflected in the continuous improvement of curriculum content, the continuous improvement of practical curriculum system, the continuous improvement in and out of class, and the continuous improvement inside and outside the school. Build multiple continuous improvement links.

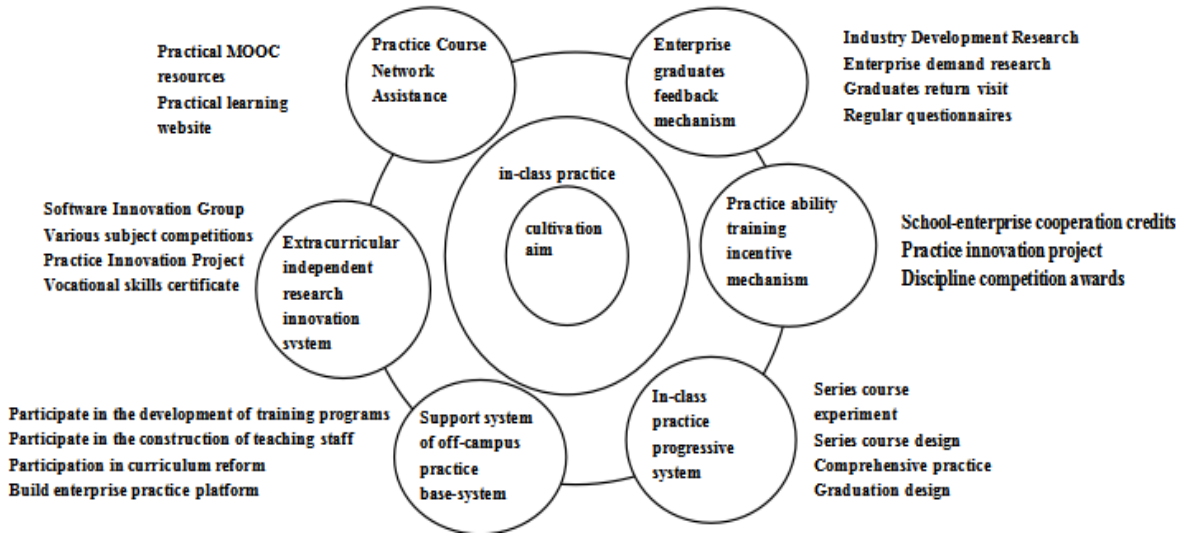

Figure 1 Reverse drive, spiral advanced ' practical ability training system.

4.4. Focusing on application, reconstructing practice teaching system from top to bottom

Long cycle training, course experiment --> course design --> school research --> enterprise training.

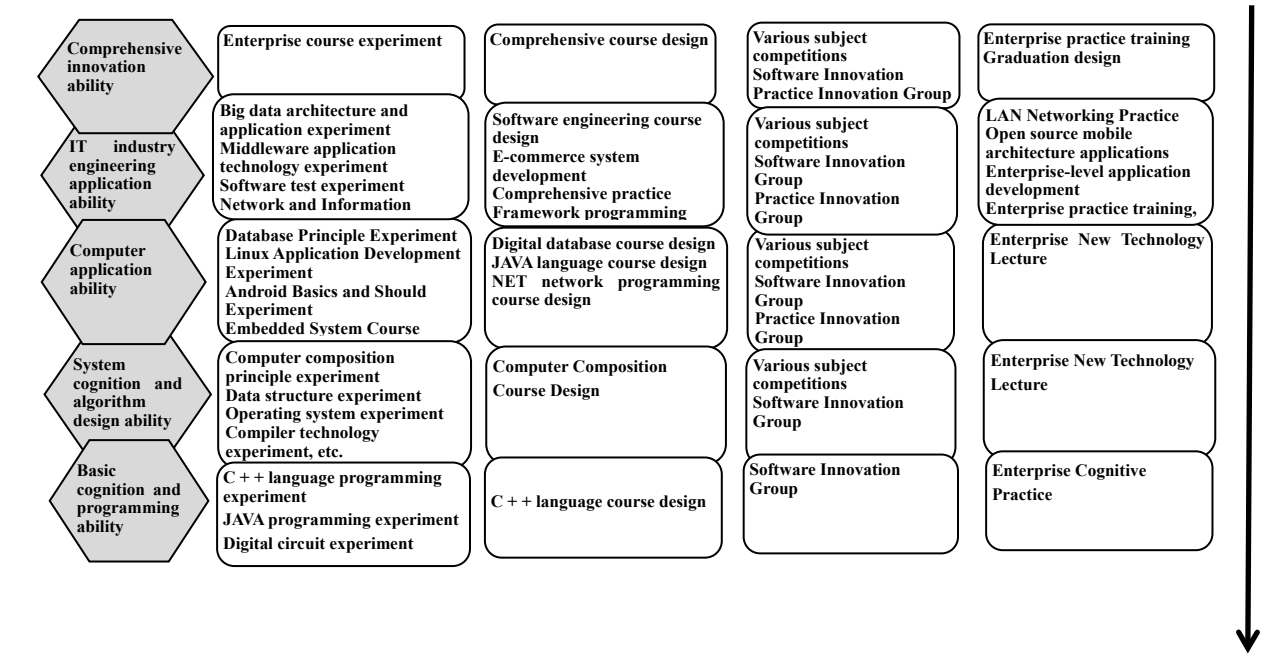

Figure 2 Top-down reconstruction of practical teaching system.

▪ According to the five-level progressive practical ability training model, the top-level design idea of reconstructing the teaching system from top to bottom is proposed. On the basis of top-level application-oriented projects, knowledge decomposition, target refinement and correlation analysis are carried out, and a practical scheme of interlocking and gradual promotion is formulated. The content is superimposed layer by layer, the ability is gradually improved, the topic selection is staged and the evaluation is diversified.

▪ A set of practical curriculum reform methods were explored : the experimental content was integrated into the enterprise case, and the teaching process of five main courses was tried to be completed in the laboratory with reference to the teaching mode of the training institution ; record practical MOOC videos and support learning websites. Ensure the realization of the concept of practical ability training.

4.5. Construct a multi-dimensional practical ability training extracurricular independent research platform

Taking students as the main body, highlighting the early, diversified and progressive cultivation of practical ability and innovation ability, an extracurricular independent research platform including software innovation group, practical innovation training program and various subject competitions is constructed. Strengthen the in-class and extracurricular complementarity, practice and competition interaction.

4.6. Establish practical ability training incentive mechanism and quality assurance mechanism

- We have developed school-enterprise cooperation credits, practical innovation credits, college students ' practical innovation project implementation plan, discipline competition plan, etc., and established practical innovation incentive mechanisms such as financial support and incentive policies.
- Secondly, we establish the enterprise system participation mechanism in the process of practical ability training, participate in the formulation and adjustment of training programs, the reform, supervision and evaluation of practical teaching content; participate in the guidance of practical innovation projects, software innovation groups and subject competitions, and undertake the teaching work of practical links, which effectively guarantees students ' adaptability to positions.

5. Conclusion

In view of the problems existing in the practical ability training of computer talents in application-oriented universities, this paper expounds the construction strategy of practical teaching quality assurance system for computer talents in application-oriented universities from three aspects : the construction goal of practical teaching assurance system, the construction idea of practical teaching quality assurance system and the construction measures of practical teaching quality assurance system. A ' hierarchical progressive ' practical ability training model was created, and a ' reverse-driven, spiral-advanced ' practical ability training system was redesigned. After more than five years of teaching practice and gradual optimization, the practical ability of graduates has been recognized by employers, and the ability of computer practical application, innovation and entrepreneurship has been significantly improved.

Acknowledgements

The research topic of quality assurance and evaluation of higher education in Jiangsu Province in 2021(51): Reverse drive, spiral progression-independent college computer talents sustainable improvement practice ability training quality assurance machine.

Topics of the National College Computer Basic Education Research Association (2022-AFCEC-252): Exploration and Practice of Spiral Advanced Practical Teaching System in Applied Universities.

References

[1] Wang Xiaowei, Zhai Yuqing, Zhu Lin, Li Xiangju, Cao Fengping, Xie Xiujuan.Exploration and Practice of Practical Ability Training System for Computer Talents in Independent Colleges [J].Experimental Technology and Management, 2018,35 (05) : 6-9

[2] Jiang Zongli.Computer specialty reform under the background of new engineering construction [J].China University Education, 2017 (8) : 34-39.

[3] Xu Xiaofei.Exploration on the reform of new engineering talent training mode for sustainable competitiveness [J].Chinese University Teaching, 2017 (6) : 6-10.

[4] You Lei, Feng Yan, Guo Song, et al. [J].Computer Education, 2021 (11) : 14-17.

[5] Gong Yongwang, Liu Qiming, Zhou Gang.Research on embedded talent training mode of school-enterprise cooperation in computer specialty [J].Software guide, 2020 (3) : 272-275.

[6] Zhang Liliang, Yang Liejun. Construction and practical exploration of practical teaching implementation plan based on ' combination of learning and application ' [J].Computer Education, 2020 (11) : 143-146

[7] Li Zhiyi, Zhu Hong, Liu Zhijun et al. [J].Research on Higher Engineering Education, 2014 (2) : 29-34, 70.

[8] Han Sheng, Tian Mei, Jia Caiyan, Yang Wujie. Exploration on the design method of computer professional practice course content [J].Computer Education, 2023 (01) : 105

[9] YOU Jiayang.Exploration on the construction of ' school-enterprise joint ' internship practice base for full-time professional degree postgraduates [J].University education, 2019 : 157-159