

Research on Competency Based Curriculum Design for Computer Majors

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Abstract. The current curriculum of computer specialty emphasizes theory rather than practice, and the training of students' engineering practice ability is weak, which is inconsistent with the needs of enterprises. There exists the phenomenon of employment or unemployment. To reform and innovate the curricula of computer specialty, this paper puts forward that the curricula system of computer specialty consists of general education curricula module, professional curricula module, practical teaching link module and innovation and entrepreneurship module. The professional curriculum module adopts the mode of school-enterprise joint training, and adopts the mode of 2.5+0.5+1 three-stage talent training. It draws a topographic map of professional curriculum training objectives and constructs a "six-in-one" modular curriculum system. Practice shows that this new curriculum can train students' engineering ability more effectively and achieve seamless integration with enterprises.

1. Introduction

The enrollment of computer majors continues to grow, but the quality of training is not ideal. There is still a gap between the knowledge and ability of graduates and the requirements of enterprises and the market. Current curriculum settings of computer specialty are relatively deficient in the cultivation of abilities and qualities, which are manifested in the weak content of subject methods, the lack of comprehensive training project courses, and the insufficient practicality of curriculum contents [1]. All these problems will result in the reduction of the quality of computer professional education and hindering the achievement of training objectives. Through contacts and understanding, now graduated computer undergraduates also generally say that they have not achieved good engineering ability growth in the learning stage, and their knowledge does not meet the needs of enterprises, so they often encounter difficulties in employment recruitment. The existing problems of computer professional curriculum need to be studied and reformed.

2. Research Status at Home and Abroad

2.1 Analysis of current research abroad.

Foreign countries attach great importance to the research and application of vocational application ability, such as the United States, Germany and so on; especially the manufacturing ability of Germany is well-known in the world. The American Vocational Education Curriculum System and Its Enlightenment points out that vocational education in the United States runs through primary school to senior high school, from the initial stage of understanding the occupation to the later clear career direction. The curriculum content is selected through the vocational field, the curriculum outline is formulated according to the vocational analysis, and the cultivation of vocational ability is put at the core position [2]. Germany, on the other hand, divides professions through the needs of the post group of the Labor Service Department. According to the actual needs, the government formulates the teaching plan of the theoretical curriculum system. The implementation of the practical curriculum is carried out by the training departments of enterprises organized by the government. Only through the final assessment of the trade associations can the vocational qualification certificate be obtained [3]. With the support of the government policy, the German school-enterprise cooperation training and the comprehensive practical ability assessment of the industry have greatly improved the vocational ability of students. In addition, foreign advanced curriculum training models such as

CBE and dual system all focus on the development of students' personal abilities and the needs of social professional posts. These research and application results provide theoretical and data support for the research of this topic, at the same time, they can broaden the horizons of team members and activate research thinking [4].

2.2 Analysis of domestic research.

In recent years, domestic colleges and universities have gradually transformed to the cultivation of applied ability. Therefore, there are many studies on the curriculum system based on ability, but most of them are aimed at the characteristics of a university, its own students, teachers and superior disciplines [5]. It can be used as a reference for the research on the curriculum design of computer science and Technology Specialty Based on ability in our university, but it can not be copied. In addition, most of the domestic research on this topic focuses on the development and application ability of students, ignoring the level and diversity of students' ability training, such as system integration ability, software testing ability, system operation and maintenance ability, which should be paid attention to in the research process of this topic [6].

3. Curriculum Setting

The curriculum system of computer specialty consists of general education curriculum module, professional curriculum module, practical teaching module and innovation and entrepreneurship module.

3.1 General education curriculum module.

General education courses include two parts: general compulsory courses and general elective courses. General Education Compulsory Course is designed for students to cultivate their political literacy, theoretical level, moral quality, physical quality and basic ability, including ideological and political theory course, college foreign language, College sports, College Chinese, military theory, psychological health education, safety education, etc. The general education elective course aims at cultivating students' humanistic qualities of pursuing truth, advocating innovation, respecting practice, promoting rational scientific spirit, healthy mind, noble sentiment and noble character. General elective courses are set up by the school, giving full play to the comprehensive advantages of the school's disciplines and curriculum resources, including humanities and social sciences, natural sciences, arts and sports and healthy life, innovative education and standardized language and writing training.

3.2 Professional curriculum module.

The major course module includes compulsory courses and optional courses. According to the orientation of students' employment and the characteristics of our school and our specialty, we flexibly set up two major course modules of "Mobile Application Development" and "Java Industry Application Development". To realize the joint talent training of school-enterprise specialty, the joint training adopts the three-stage talent training mode of 2.5+0.5+1. The first to fifth semester (2.5 academic year) courses are completed in schools, mainly taught by school teachers; enterprises send enterprise teachers to schools in specific courses/practice links. These links include: enrollment orientation, freshmen entrance education, and primary school curriculum design training. The sixth semester (0.5 school year) is completed at the enterprise base and is taught by the faculty. This part of the course is a professional characteristic course and is directly linked to the personnel of the enterprise. In the 7th and 8th semesters (1 academic year), enterprises recommend students to enter various employing units for internship, and guide students to complete graduation design.

The curriculum design scheme includes two major courses: compulsory and compulsory courses, course design training, comprehensive project training, professional technical courses, vocational quality courses and graduation design.

The employment objectives of mobile application development direction include Java development engineer, Android application development engineer, implementation engineer and test engineer. The main compulsory and compulsory courses include: freshmen entrance education and cognitive practice*, C language programming, C language curriculum design*, Java language programming, data structure and algorithm, Java language curriculum design training*, database theory and application, Web UI foundation, Android programming foundation, Android curriculum design training*, and so on. Linux Operating System,

Java EE Programming, Introduction to Software Engineering, Java EE Course Design Training*, Java Open Source Framework Programming*, Java Open Source Framework Course Design Training*, Mobile Web App Development Technology*, Mobile Web App Course Design Training*, Android Advanced Programming*, Android Advanced Course Design Training*, Software Workers Cheng Method and Practice*, Mobile Application Comprehensive Project Training*, Graduation Project Training*, Career Planning and Professional Quality*, Job Search and Written Examination Interview Skills*, Graduation Design Examination and Defense*, Graduation Thesis and Practice*. The course labeled "*" is sent to schools by companies, or at the corporate base.

Employment objectives of application development direction in Java industry include Java development engineer, Java Web development engineer, implementation engineer and test engineer. Major compulsory and compulsory courses include: freshmen entrance education and cognitive practice*, C language programming, C language curriculum design*, Java language programming, data structure and algorithm, Java language curriculum design training*, database theory and application, Web UI foundation, Java SE core development technology*, Java SE curriculum design training*, and so on. Linux Operating System, Java EE Programming, Introduction to Software Engineering, Java EE Course Design Training*, Java Open Source Framework Programming*, Java Open Source Framework Course Design Training*, Modern Web Front-end Development Technology*, Modern Web Front-end Course Design Training*, Software Development Process Management*, Requirement Analysis and Solution Architecture* Software Testing and Quality Management*, Java Middleware*, Java Distributed Computing Development*, Enterprise Application Comprehensive Project Training*, Graduation Project Training*, Career Planning and Professional Quality*, Job Search and Written Examination Interview Skills*, Graduation Design Check and Defense*, Graduation Thesis and Practice*. The course labeled "*" is sent to schools by companies, or at the corporate base.

3.3 Practice link module.

We will further improve the specific implementation plan of the practical teaching system and integrate the training of practical ability and innovative entrepreneurship education into the whole process of personnel training. We should increase the proportion of practical teaching, strengthen the systematicness, integrity and comprehensiveness of practical teaching links, pay attention to enhancing students' innovative spirit and entrepreneurial consciousness, and highlight the cultivation of students' ability to analyze and solve problems, innovative and entrepreneurial abilities and comprehensive application abilities. Practice module includes educational practice, professional practice, graduation thesis and comprehensive training, military training and entrance education, social practice and so on.

3.4 Innovation and entrepreneurship module.

In order to enhance students' awareness and ability of innovation and entrepreneurship, create a good atmosphere and a relaxed environment for students' innovation and entrepreneurship, the first classroom and the second classroom are organically integrated, 8 credit credits for innovation and entrepreneurship are set up, and a complete credit system is implemented. This module is composed of three sub-modules: innovation and entrepreneurship theory, innovation and entrepreneurship practice, and quality development. Among them, the sub-module of innovation and entrepreneurship theory has three credits. Students must take the courses of innovation and Entrepreneurship such as "career planning for college students", "foundation for entrepreneurship" and "employment guidance for college students". The sub-module of innovation ability and entrepreneurship practice has 2 credits, which can be obtained by carrying out innovation experiments, participating in science and technology competitions, participating in scientific research topics, publishing papers, obtaining patents, and developing entrepreneurship practice. The quality development sub-module has 3 credits, which is composed of quality development innovation system. It can be obtained by participating in sports activities, volunteer service and training of Party and League courses.

4. "Six in one" Modular Curriculum System

In recent years, our institute has strengthened the reform and construction of talent training curriculum system with the core of cultivating solid professional foundation, innovative spirit and engineering practice

ability. The curriculum system should be reconstructed according to the "six abilities" of students' development, and different curriculum modules should be set for different abilities, so as to realize the transformation from the traditional knowledge input-oriented curriculum system to the knowledge output-oriented curriculum system, thus forming a "six-in-one" modular curriculum system as shown in Fig. 1. The cultivation of engineering practice ability runs through the teaching process. Taking the ability of discovery, analysis and problem solving as an example, its topology diagram is shown in Fig. 2.

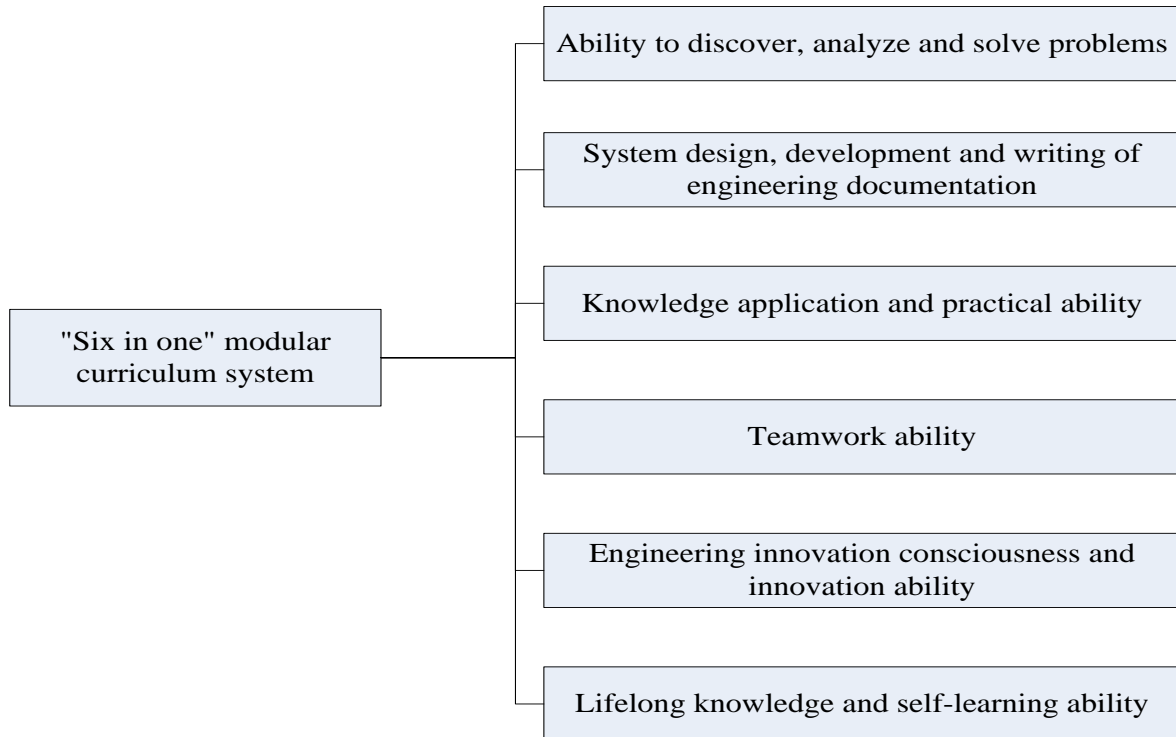


Fig. 1 "Six in one" modular curriculum system

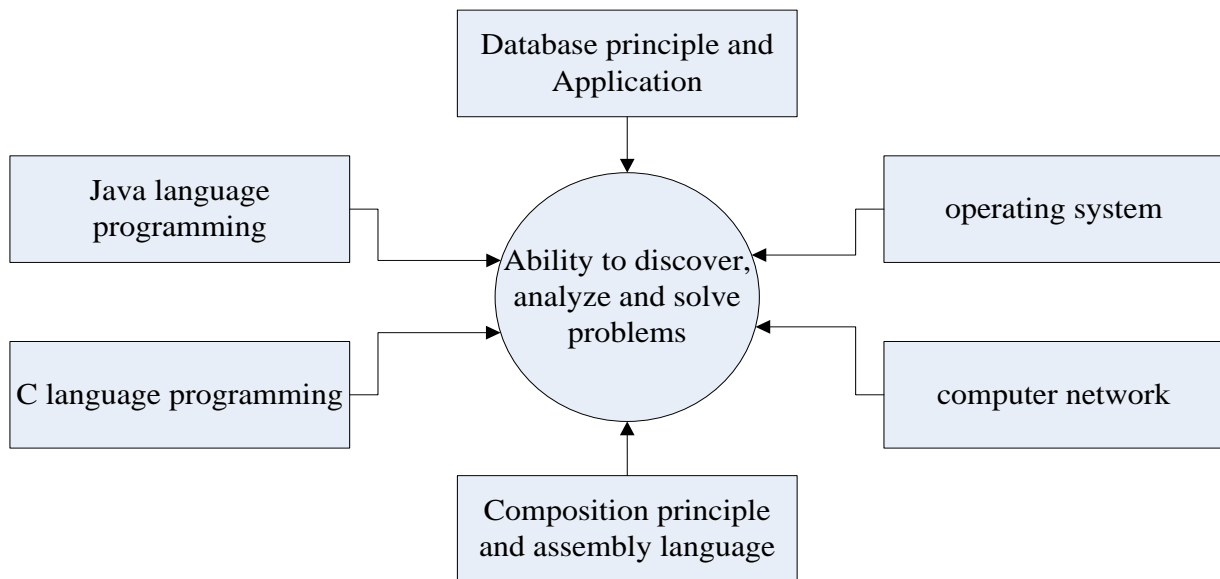


Fig. 2 Topology of ability to discover, analyze and solve problems

5. Conclusion

Computer science is a very practical frontier science and technology specialty. Only by constantly improving their own curriculum, eliminating the old and the new, increasing the teaching quantity of practical

courses, and strengthening the students' practice time and supervision, can we truly proceed from the social reality and cultivate the computer talents needed by the society, so as to enhance the students' competitiveness and employment ability in enterprises.

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