Research on Computer Course Teaching Reform and Applied Talents Training based on Industry Demand

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Abstract: Aiming at the problem that the current curriculum teaching and talent training programs in colleges and universities have poor adaptability to the industry, this paper puts forward the computer teaching reform and application-oriented talent training programs based on the needs of the industry. Analyze the demand index of computer industry and establish the demand index system. The analytic hierarchy process is used to analyze the weight of each index, and the teaching plan is reconstructed in descending order according to the weight of index, so as to carry out teaching reform. According to the reform of the teaching plan to improve students' grasp of theoretical knowledge, through school-enterprise joint training, strengthen students' practical ability, train the computer industry applied talents. Compared with the current teaching and training scheme, it proves that the students are more suitable to the needs of computer industry.

Keywords: Industry demand; Computer courses; Teaching reform; Application-oriented personnel training

1. Introduction

The computer industry is the main industry in the future development of our country. At the present stage, the rapid development of China's computer industry and talent transfer appeared imbalance, the demand for computer professionals in the year by year growth, but still cannot meet the needs of the computer industry. At present, there are problems in the teaching of computer courses in colleges and universities. Many colleges and universities still use the teaching system of academic research in the course setting of computer majors, without adjusting it according to the needs of the industry. Unreasonable structure of computer course teaching and the teaching plan of problem is more serious, still dominant theory knowledge teaching, curriculum system mainly adopts the traditional three-step teaching method, the teaching model is suitable for cultivating computer academic talents, not suitable for cultivating applied talents, and industry demand serious [1]. At the same time, the shortage of teachers is also one of the reasons affecting the teaching of computer courses. Compared with theoretical knowledge, the traditional education mode cultivates teachers' application ability which is poor, and there are serious deficiencies in the cultivation of students' practical ability and practical application ability.

Computer course teaching in colleges and universities has undergone two reforms, from clarifying the importance of computer course to making computer course more mature, and then it has been developed until now. At present, there is a huge talent gap in the computer industry. In order to meet the needs of the industry, the teaching of computer courses in colleges and universities should be reformed to focus on cultivating application-oriented talents [2]. Therefore, in view of the existing problems in the teaching process of computer courses in colleges and universities, this paper, based on the needs of the industry, makes the following research on the teaching reform of computer courses and the cultivation of application-oriented talents.

2. Computer Course Teaching Reform and Application-Oriented Personnel Training Program based on Industry Demand

In the computer industry, the demand for applied talents is increasing, while the demand for theoretical talents has tended to be saturated. Moreover, in the teaching system of computer major in colleges and universities, the cultivation and teaching of students are closed to some extent due to various objective reasons. Students have mastered solid theoretical knowledge at school, but they have to study again when they enter the workplace, which not only delays the career development process of students, but also inevitably consumes a large amount of input from the industry for training new personnel, which is easy to cause a vicious circle [3]. Therefore, this paper puts forward a computer course teaching reform and application-oriented talent training program based on industry demand, as shown in figure 1.

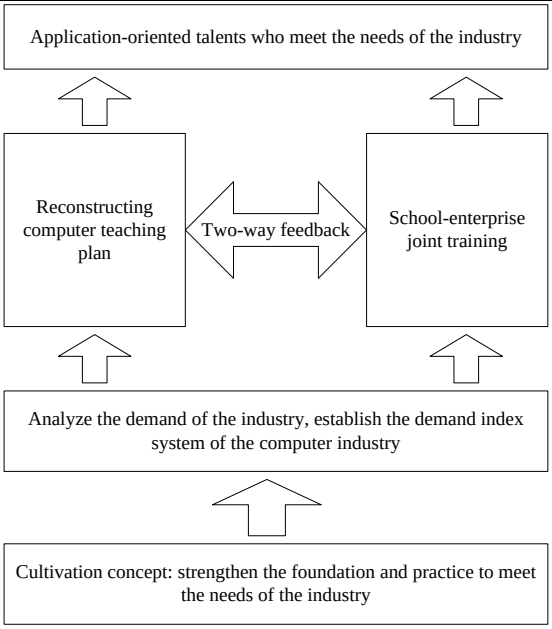

Figure 1. Schematic diagram of the scheme

2.1. Establish an industry demand indicator system

Before the reform of computer course teaching, it is necessary to establish an industry demand index system. The ability demand of computer industry is divided into professional ability demand, method ability demand and social ability demand. Among them, professional competence needs to include professional theoretical knowledge, practical operation ability, adaptability and foreign language application ability. Professional competence is an important condition for being qualified for the job, as well as the basic condition for working in the computer industry, and also determines the future development space of practitioners in the industry. The demand for method ability includes learning ability, innovation ability and problem solving ability. Method ability is a highly valued ability of a computer enterprise, and it is also the guarantee for employees to grow rapidly in the fierce competition of the industry. Social needs include professional ethics, responsibility, teamwork and language skills. The social ability of employees is an important indicator to determine the future development of an enterprise [4]. According to the above three major computer industry demand for talent ability, the analytic hierarchy process is used to establish the computer industry demand index system.

As shown in figure 2, the whole demand indicator system is divided into three levels. The computer talent cultivation indicator is set as the top level as the target layer A, that is, to achieve the goal of solving the overall evaluation of talent cultivation. The middle layer is the criterion layer b. three indexes, namely professional ability, method ability and social ability, are selected to evaluate the quality of talent cultivation. The lowest layer is the criterion layer C, which is further refined into 11 indicators [5].

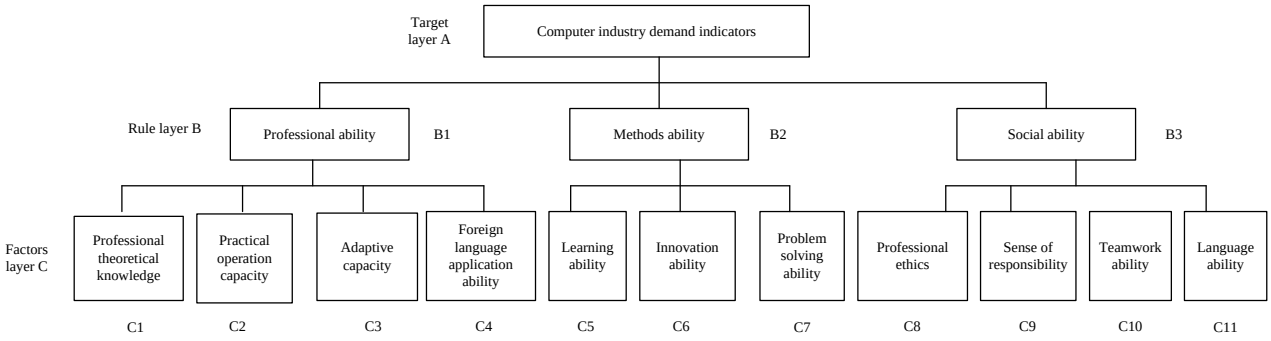

Figure 2. Demand indicator system

The judgment matrix is constructed according to the indicator system in figure 2, and the scale is 1-9. The two objects are divided into "equally important", "slightly important", "obviously important", "strongly important" and "extremely important". Another level is inserted in the adjacent two levels, with a total of 9 levels, to form a judgment matrix, whose scale is shown in table 1.

Table 1. Scale Table of judgment matrix

Scale aij	Definition	Explanation
1	Equally important	Element i is equally important as element j
3	Slightly more important	Element i is slightly more important than element j
5	Obviously important	Element i is obviously more important than element j
7	Strongly important	Element i is strongly important than element j
9	Extremely important	Element i is extremely important than element j
2468	Between the adjacent judgment	Folding degree of the above two judgments
Inverse of the above number	Inverse comparison	Inversely compare element i with element j

For n indexes of the same level, pair wise comparison judgment matrix $A=\{a_{ij}\}$ can be obtained, in which $a_{ij}>0, a_{ij}=\frac{1}{a_{ij}}, a_{ij}=1$ [6].For the pare wise comparison and judgment of b-level indicators, the judgment matrix A of b-level indicators is obtained according to the relationship between professional ability B1 and method ability B2, social ability B3, and method ability B2 and social ability B3.

$$A=\begin{bmatrix} 1 & 2 & 3 \\ 1/2 & 1 & 4 \\ 1/3 & 1/4 & 1 \end{bmatrix} \quad (1)$$

Calculate the product of each row of elements in the judgment matrix, Mi.

$$M_i=\prod_{j=1}^{n} a_{ij}, i=1,2,3,\ldots,n \quad (2)$$

According to formula (2), M1=6, M2=2, M3=1/12. Calculate the n word square root $\bar{W}_i$ of Mi.

$$\bar{W}_i=\sqrt[n]{M_i}, i=1,2,3,\ldots,n \quad (3)$$

In the above formula, n is the order of matrix, then the square root of n words of Mi is calculated according to formula (3), which is $\bar{W}_1=\sqrt[3]{6}=1.817$, $\bar{W}_2=\sqrt[3]{3}=1.259$, $\bar{W}_3=\sqrt[3]{1/12}=0.436$ successively. For vector $w=\left[\bar{W}_1,\bar{W}_2,\ldots,\bar{W}_n\right]^T$ of composition, normalization is performed according to formula (4) [7].

$$W_i=\frac{\bar{W}_i}{\sum_{i=1}^{n}\bar{W}_i} \quad (4)$$

Take the matrix A and multiply it by the vector W to find the maximum eigenvalue λ_{max} of the matrix A. In order to scientifically reflect the relative importance of each indicator, after obtaining the weight vector of the judgment matrix, it is necessary to conduct consistency test on its effectiveness [8]. Consistency index CI was calculated.

$$CI=\lambda_{max}-n/(n-1) \quad (5)$$

Find the average consistency index RI of the same order matrix and calculate the consistency ratio CR. When n=3 and RI=0.58, CR=CI/RI=0.0929. Repeat the calculation process, the weight of various indicators for the total target, in order to weight size can discharge the importance: professional ability method > > social ability, so the computer professional personnel training, professional ability as the first ability, method ability for the secondary ability, social ability is the ability to center. Among all the elements of professional ability, the weight of practical operation ability is the largest. Therefore, it is necessary to pay attention to practical operation ability in the training of computer professionals. Similarly, the cultivation of method ability should first attach importance to learning ability. Social ability training, pay attention to professional ethics. After determining the weight of the industry's demand for computer professionals, the original computer teaching plan is reformed according to the established index system.

2.2. Reform the teaching plan of computer course

In order to cultivate application-oriented talents that meet the needs of the industry, according to the established ability demand index system, the teaching plan of computer courses is reformed. The reformed teaching plan is shown in the following figure. The course is divided into three parts, which are public basic course, subject basic course and professional course. The public basic courses are the public courses for science and technology students, and the teaching plan of this part is completed according to the school's public courses. Subject basic course is a compulsory course for all students majoring in computer science. All students majoring in computer science should study according to the teaching plan. Professional courses are taught in one or two directions according to the students' own will.

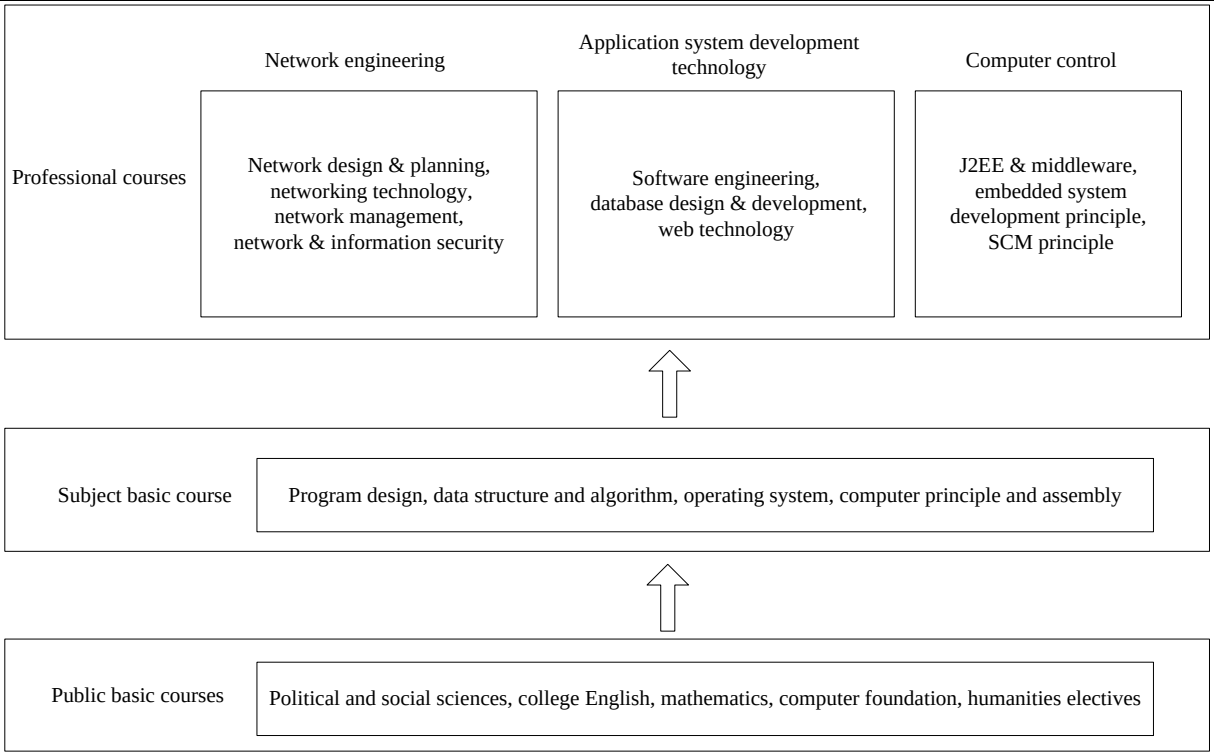

Figure 3. Teaching plan

In the reform of teaching schedule, the reconstructed new computer course teaching calculation divides students' 4-year school time into three parts, namely, students learn public basic courses and subject basic courses in the first 2.5 years, learn professional courses in the first year, and enter the industry for internship in the remaining half year. In detail, students are required to complete professional electives and certification courses in addition to the course credits specified in the fixed schedule. For the study of professional elective courses and certification courses, students can choose the corresponding courses for personalized study according to their own interests and the direction of graduation in the future.

Reform in teaching methods and means. Break through the original one-way teaching mode dominated by teachers, always around cultivating and improving students' knowledge and ability to apply the knowledge to analyze and solve problems, to organize teaching teachers make full use of modern education technology, adopts two-way interactive teaching, case teaching advanced teaching means and methods, combined with their own research direction and subject to teach students the latest and practical professional knowledge [9].

Teachers should be trained, and their practical teaching level should be improved by encouraging and supporting professional teachers to actively participate in computer technical training, strengthening the exchange of practical experience. According to the demand of professional knowledge, we should introduce excellent computer talents, improve the learning source structure of teachers, improve the overall quality of professional teachers, invite computer application engineers with rich practical experience from enterprises to take part-time jobs in schools, guide students' practical courses, and strengthen students' practical ability. Teaching students according to the reconstructed teaching plan improves their ability to master professional knowledge. However, in order to meet the needs of the industry, practical attention should be paid to cultivating application-oriented talents.

2.3. School-enterprise cooperation to cultivate application-oriented talents

The establishment of effective school-enterprise joint training mechanism can greatly improve students' practical ability. The school organizes students to attend lectures from different practitioners of the computer industry at ordinary times, through which they can intuitively feel the changes in the industry. The interactive opportunities in the seminar allow students to understand the confusion in their learning process and the research direction they are interested in from the industry. The exchange meeting can introduce students with different learning progress to different degrees and help them understand the computer industry.

In accordance with the latest industry development situation, the establishment of campus and off-campus train-

ing laboratories. It plays an important role in training the practical ability of computer students. A number of experiment and training rooms for computer majors have been established, and each experiment and training room is equipped with relatively advanced teaching equipment and experimental equipment, so that students can ensure certain practical operation experience in daily teaching activities [10]. At the same time, in the computer application of personnel training, we must be connected with the industry.

Take the computer industry demand as the guidance, and the off-campus enterprise orientation joint training. By cooperating with off-campus enterprises to cultivate students, it not only enhances students' practical ability, but also solves the problem of shortage of human resources in the short peak period of employment for enterprises. Moreover, excellent students can directly get internship opportunities or even formal job opportunities in the practice process. Therefore, in the joint training with off-campus enterprises, it is necessary to track the market needs, timely adjust the practice training system, and timely update and adjust the knowledge system of computer professional teachers.

3. Case Verification

The computer course teaching reform and application-oriented personnel training program proposed in this paper aims to make the universities more targeted in the training of students, and the students trained can better adapt to the needs of the industry. In order to verify the adaptability of the scheme proposed in this paper to the requirements of the industry, the method of case verification is adopted to test.

3.1. Case verification content

In order to speed up the experimental process, the experimental subjects were selected as juniors who were about to start learning computer major courses. The students of the same major were divided into two groups according to the serpentine order of basic course scores. To ensure the rigor of experimental verification, all computer courses are taught by professors of the same level.

Students in groups 1 and 2 are the research objects. The professional training of group 1 students was carried out according to the plan proposed in this paper, while the professional training of group 2 students was conducted according to the original plan of the school. In the process of verification, the same internship and other practical opportunities are provided for the two groups of students. The training effect of the program proposed in this paper is verified by comparing the evaluation obtained by the two groups of students in the internship, as well as the employment rate and salary after graduation.

3.2. Case verification results

The verification results of cases are shown in table 2, and the experimental conclusions are drawn from the analysis of table 2.

Table 2. Experimental results

Project	Students in group 1	Students in group 2
Number of students obtained excellent in internship evaluation	25	11
Number of students obtained good in internship evaluation	70	59
Rate Of graduate school/%	2%	9%
Average monthly salary/K	15	7
Employment rate/%	95%	77%

Comprehensive analysis table 2 shows that in the internship organized by the school, 25 students in student group 1 received excellent evaluation, and 70 students received good evaluation. In student group 2, 11 students got excellent evaluation, and 59 students got good evaluation. Internship evaluation is the direct evaluation of students by their direct supervisors and colleagues during the internship. This index can indicate that students in student group 1 perform better than students in student group 2 in all aspects during the internship. In terms of the graduate school enrollment rate, student group 1 is lower than student group 2, indicating that more students in group 1 are application-oriented talents, while more students in group 2 are research-oriented talents. The average monthly salary of students in group 1 is more than two times higher than that in group 2, which indicates that students in group 1 can get higher salary by virtue of their ability. It also indicates that the industry prefers group 1 middle school students in recruitment. Comparing the employment rates of the two groups, the employment rate of group 1 was nearly 1/4 higher than that of group 2, indicating that students in group 1 could find suitable jobs faster. To sum up, students trained according to the scheme proposed in this paper can better adapt to the needs of the computer industry, and can cultivate more applied talents in the computer industry, which is more advantageous than the scheme being implemented in colleges and universities.

4. Conclusion

With the development of social economy and the progress of computer science and technology, the requirement of professional ability of computer talents is getting higher and higher. Based on industry demand, this paper studied the computer course, in the process of

cultivating computer applied talents in colleges and universities needs to be guided by the demands of industry, improve the students' practical ability, actively cooperate with enterprises, changing teaching system, let the talent training tightly close to the social demand for talents, eventually cultivate applied talents to satisfy business needs.

5. Acknowledgments

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