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Construction of Innovative Thinking Training System for Computer Majors under the Background of New Engineering Subject

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Abstract. Computer major has trained a large number of computer related talents for the society. The graduates of this major are an important force of social development, and also make a significant contribution to the development of the national economy. Paying attention to the new demand of social development for high-quality computer talents, targeted training is the key to the development of scientific and technological innovation. Firstly, the paper points out the main problems affecting the cultivation of talents in this major. Then, based on the basic idea of new engineering subject, it discusses how to renew the basic educational concept of computer major, strengthen the cooperation between industry and university, reform according to the requirements of new engineering subject, and realize incremental optimization, stock adjustment and cross-integration from various aspects.

Keywords: New engineering subject, Computer Major, Personnel Training, Educational Idea, Industry-University Cooperation, Teaching Reform.

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1. Introduction

According to statistics, up to 2016, the number of computer majors in China, including 6 basic majors and 7 special majors, has reached 2956. In addition, in recent years, the salary of computer graduates, whether half a year after graduation or three years after graduation, ranks first in all majors. The rapid development of Internet and "Internet +" (mobile payment and so on has been the world's leading), the rapid development of mass innovation and entrepreneurship has made it one of the new driving forces of social development, which has created great demand for computer professionals. It can be predicted that this momentum will continue for quite a long time in the future. Of course, this phenomenon not only illustrates the importance of computer professionals, but also shows that the society has a greater, more vigorous and long-term sustained demand for these professionals, and there is a big gap between the talents trained in this profession and these needs, especially the new ones in the future. Where is the gap? What is the key to the problem? How to carry out the reform? It is worth our in-depth thinking and exploration.

2. Related Work

According to the research progress at home and abroad, different scholars also have a certain degree of cooperative research on the innovative thinking training system of computer majors. Although hardware and software technology is running faster, there is a doubt that all older gamers who use high-speed computers can work faster with today's speed or functional computers. In this context, Shafiulla S proposed a model to simulate the analysis of the interaction between the cognitive responses of the brain to gaming at different ages. The model in turn adheres to the actual reaction speed of the brain, allowing people to perceive work at different speeds and identify different ways of working [1]. Using the principle of blended learning, Wang R proposed a blended learning model combining online assessment and computer programming courses [2]. The Rizk N study aimed to understand the impact of metacognitive strategies on the development of creative thinking in primary school students. They were defined as students with IQ scores of 120 and above according to the Wakslar Children's Intelligence measure and were selected by their teachers [3]. The Dessie W M study increases the innovation point of companies by examining whether training encourages small companies to be more creative and innovative. It does this by investigating the extent of creative and innovative activities of small enterprises (SEs) trained with the support of the Ethiopian Technical and Vocational Education and Training System [4]. The aim of Garad A is to propose an organizational learning model that can help organizations transform into learning-driven organizations; the model considers the entire ecosystem and its subsystems, and takes into account the importance of technology, digitization, and dataism [5]. The purpose of Biletska EM research is to develop an innovative system of educational means for the formation of preventive thinking of students in higher medical education institutions, involving professional-oriented doctoral undergraduate training [6]. Cao K takes the application of "Internet +" in sports training and monitoring as the research object, and uses the literature method,

model parameter construction method and application demonstration method to carry out innovative research on the service system. In this service system, the new thinking of "Internet +" uses Internet technology and platform as the medium [7]. However, these scholars did not discuss the construction of the innovative thinking training system for computer majors based on the background of new engineering, but only discussed its significance unilaterally.

3. Major Problems Affecting the Quality of Education for Computer Majors

Computers are relatively young. In 1956, Harbin University of Technology and Tsinghua University took the lead in setting up computer specialty in accordance with the needs of the construction of China's "Vision Plan for the Development of Science and Technology for the Twelve Years 1956-1967". By 1960, 14 colleges and universities in China had set up computer specialty; from 1978 to 1993, 123 universities had increased to 137; and by 2012, 931 universities had set up computer specialty. In this period of time, because of the continuous innovation and development of science and technology, some new computer majors are gradually set up in universities. In 1998, the figure of network engineering major appeared in the professional catalogue issued by the Ministry of education. By 2001, there were 12 major of network engineering in China. With the continuous development of emerging industries, the country's demand for talents is also increasing. Therefore, software engineering, Internet of things engineering and information security have been established. The major includes six basic majors and a number of ad hoc majors. Computer Science and Technology is one of the majors. By 2016, there were 2956 computer specialty points, and 985, 598, 503 and 427 computer science and technology specialty, software engineering specialty, Internet of Things engineering specialty and network engineering specialty respectively ranked the top four. These developments have obvious characteristics of "extension development", which can be regarded as a stage of the development of this major. After the development of denotation, we are now turning to the stage of "connotative development" which focuses on improving quality. The construction of new science and technology is an opportunity to promote the strategic transfer of development. Therefore, we must solve the problems that affect the connotation professional development. In the author's opinion, there are three main problems.

3.1. Basic Ideas of Education Need to be Renewed

First of all, we should change from traditional teaching-centered to student development-centered. In the stage of elite education, specialties are subject-oriented. Specialized education emphasizes the systematic and comprehensive coverage of the corresponding backbone disciplines. Graduates are assigned to certain posts according to the needs of the country. They rely on solid foundation to gradually adapt to work. This elite education mode cannot adapt well to the reality of talent training in the stage of popular education. In the stage of popular education, education must be designed and

implemented according to how the educated can better meet the needs of society. That is to say, in the stage of elite education, specialty aims at the problem space of the whole discipline and specialty when planning and implementing personnel training, while in the stage of popular education, it should implement classified training, and divide the problem subspace adapted to the students' specialty points in the problem space of the whole discipline and specialty, so as to deal more effectively with the contradiction between the limitation of students' time in school and the infinity of knowledge. As well as the contradiction between the fundamentality of education and the futurity of exploration and creation, we should make better and more effective use of limited time and face the future so as to enable students to better develop their specialties, provide better services for the society and realize the goal of "promoting their strengths for excellence". Therefore, we need to focus more on social needs and student development.

Secondly, closely related to the first point, we should shift from curriculum-oriented education (CBE) to output-oriented education (OBE). The key difference between output-oriented education and curriculum-oriented education lies in whether output (ability) or input (knowledge/curriculum) is pursued. Course-oriented education pays attention to what kind of courses should be learned, which are the main courses in these courses (so some professional norms and standards specify what courses must be taken by the specialty). Course teaching pays attention to how well the teachers are doing, and course examination pays attention to the coverage of the knowledge points of the course by the examination papers. In this mode, there will be the key knowledge coverage of examinations (determining the key points before examinations, etc.), a hotbed for examination-oriented education, and opportunities for the existence of specialties that are not qualified (as long as the listed "name" courses are available, as for the understanding of the specialty, whether there are basic professional conditions is not so important). Output-oriented education focuses on students'ability to solve problems. According to the international equivalent standard, two-year college graduates only need to solve narrow engineering problems, three-year college graduates will solve broad engineering problems, and undergraduates will solve complex engineering problems. Therefore, the degree to which the undergraduates majoring in computer science should acquire knowledge is sufficient to support the solution of complex computing problems. They should learn to analyze and design, and take into account the corresponding social, ethical, moral, legal and other social factors. In this way, it is difficult to achieve the goal only by experience. What we need is more scientific and more elaborate design and teaching implementation: design training objectives, design suitable graduation requirements, decompose graduation requirements, design appropriate curriculum system and carry out appropriate education according to the needs of graduation requirements.

Thirdly, establish a perfect continuous improvement (CQI) system. Perfect continuous improvement system is different from the traditional quality monitoring system currently in operation in most schools. The traditional quality monitoring system serves curriculum-oriented education [8]. Its focus is to monitor teachers and monitor how well they teach. The perfect continuous improvement system is to fully reflect the needs of student-centered and output-oriented education, its quality monitoring mechanism is to promote students to effectively achieve the curriculum objectives and graduation requirements embodied in the ability requirements; the graduate tracking feedback mechanism and social evaluation mechanism is to evaluate the rationality of

training objectives and promote their realization, taking into account the evaluation and reform of graduation requirements. Enter. Especially in the perfect continuous improvement system, the requirements are not isolated evaluation and simple feedback, but feedback based on system evaluation and improvement based on evaluation.

3.2. Standard of Talent Training Needs to be Accelerated

As an expert organization hired and led by the Ministry of Education, the Professional Teaching Steering Committee is entrusted by the Ministry of Education to carry out research, consultation, guidance, evaluation and service of undergraduate teaching in Colleges and universities. In recent three years, the Teaching Steering Committee of computer specialty has developed and issued professional norms, standards and relevant guidance, and has carried out a large number of extensive publicity and promotion. They have played an important role in promoting the construction, reform and development of computer specialty. For example, "Strategic Research Report and Professional Specification on the Development of Computer Science and Technology Specialty in Colleges and Universities", "Public Core Knowledge System and Courses of Computer Science and Technology Specialty in Colleges and Universities", "Implementation Plan of Core Course Teaching for Computer Science and Technology Specialty in Colleges and Universities", "Composition and Training of Professional Ability of Computer Science and Technology Specialty in Colleges and Universities", "General Higher Instructions on Computer Science and Technology for Undergraduates of the University, National computer professional teaching quality standards (to be officially released). In addition, other documents are instructive. The document has not been officially released by the Ministry of education. Therefore, it can be considered that the computer professional teaching quality is still lack of national standards. In addition, although in the guidance documents listed above, we have begun to guide all majors to get rid of the constraints of the curriculum, giving the recommended areas of knowledge, basic requirements for training, and the ability composition of computer professionals, etc., we have not yet clearly and thoroughly guided education from curriculum-oriented education to output-oriented education. In addition, people come from the traditional curriculum-oriented education, which makes the training of talents based on appropriate standards just start, and there is still a long way to go from full implementation. It is for these reasons that the orientation of undergraduate teaching is not clear or even deviated. Many specialty-oriented education of engineering degree has not yet realized that it should focus on cultivating students'ability to solve complex engineering problems. There are also some specialty points, such as emphasizing theoretical teaching (not required theoretical teaching), neglecting practical teaching, and "scientific engineering education".

3.3. Quality consciousness of talent training needs to be strengthened

Quality is the lifeline of professional development [9]. However, in the case of denotative development complex, people's quality consciousness is still relatively

indifferent. The curriculum-oriented education concept not only makes it difficult for professional education to meet the requirements, but also opens the door for examination-taking and simple 60-point "meeting the standard".

In addition, as mentioned earlier, the traditional quality assurance system has been unable to meet the current needs of personnel training, and the new continuous improvement system needs to be established and improved [10].

3.4. Cultivation of Innovative Thinking Ability

(1) Adjust the teaching content.

To cultivate the innovative thinking of college students majoring in computer science, it is necessary to add a link to cultivate students'innovation ability in the daily teaching plan, so that students can understand and master the process characteristics and forms of the formation of innovation ability in the usual learning process, and cultivate innovation purposefully Awareness, and constantly stimulate students'enthusiasm for innovation.

(2) Reform teaching methods.

The premise of innovative thinking is to have a wealth of professional knowledge and extensive relevant professional knowledge. This knowledge depends on students' independent learning on the one hand, and teachers on the other hand. Computer professional teaching has the generality of general teaching, but it also has special professional characteristics based on its particularity [11].

(3) Create an atmosphere of innovation.

Cultivating students'innovative thinking, stimulating students'interest in innovation, and creating a good campus innovation atmosphere is a basic task [12-13]. Organize and carry out popular innovation activities through all-round, multi-level and wide channels to attract students'attention and stimulate their enthusiasm for participating in innovation activities, and strive to create a strong innovation atmosphere on campus, infect and nurture a large number of students, and promote They participate in scientific research and innovation activities and gradually cultivate students'innovative thinking and innovative spirit [14-15].

(4) Cultivate the spirit of innovation.

During the teaching period, teachers should encourage students to ask questions, do not easily deny students' ideas, do not rashly judge students' innovative thinking viewpoints, and encourage and praise innovative and exploratory student thinking models [16].

Reference evaluation is not only limited. In textbooks, standard answers are not set,and students are encouraged to think about the answers to questions in multiple ways and perspectives, and not blindly believe in authority [17].

(5) Strengthen the teaching staff.

Teachers are leaders. To cultivate computer professionals with innovative thinking, teachers must first be innovative [18]. If a computer professional teacher has no development experience and research ability himself, and only teaches textbooks, then there is no way to cultivate students' innovative thinking and ability Teachers who have scientific research and innovation capabilities and rich practical experience can use examples and vivid examples in the course of teaching; they can analyze and think sharply in practical links such as graduation design and curriculum design [19].

4. Basic Thought and Path of New Science Construction

4.1. Basic Thought and Path of New Science Construction

It is an inevitable requirement for the development of China's higher engineering education to adapt to the construction of engineering education at a new historical starting point [20]. Wu Aihua and others pointed out that: China's economic development is entering a critical period of structural adjustment, transformation and upgrading, and the momentum of new and old growth is changing [21]. A new round of technological and Industrial Revolution centered on the Internet awaits development. Innovation has become a new arena of International competition, which not only provides strategic opportunities for later countries to catch up and surpass, but also provides strategic opportunities for them. Further intensify the international talent competition. Engineering education and industrial development are closely linked and mutually supportive. The development of new industries depends on engineering education to provide talent support. Especially to meet the challenges of international competition in new technologies and industries in the future, it is necessary to actively lay out the training of Engineering Science and technology talents, accelerate the development and construction of new engineering specialties, transform and upgrade traditional engineering specialties, and enhance the ability of engineering education to support the development of service industries. It can be said that the active layout of engineering education and the deepening of reform in place will have a positive role in promoting economic transformation and upgrading; on the contrary, the lagging reform of engineering education will delay the process of industrial upgrading.

The construction of new engineering subjects should "set up new ideas of innovative, comprehensive and full-cycle engineering education", construct a new structure of engineering specialty through incremental optimization, stock adjustment and cross-integration, clarify the ability system of Engineering talents, construct

curriculum system according to engineering logic, cultivate students'innovative spirit, entrepreneurial According to the thinking logic of engineering discipline, the course teaching system is constructed, the students' innovative consciousness and entrepreneurial ability are cultivated, and the quality standard system of engineering talents training is established and improved. Form classification culture and improve quality. From the discipline orientation to the industrial demand orientation, from the professional division to the cross-border integration, from the service adaptation to the support orientation, we explore a new engineering development paradigm.

4.2. The Construction of Innovative Thinking Training Mode for Computer Majors

Through the analysis of the status quo of three representative vocational schools, compared with other vocational schools that have been more successful in the construction of computer majors, combined with the actual situation, based on the market-oriented, for the training of computer professionals, a long-term class "1 The training mode combining +1+1" and short classes is shown in Figure 1.

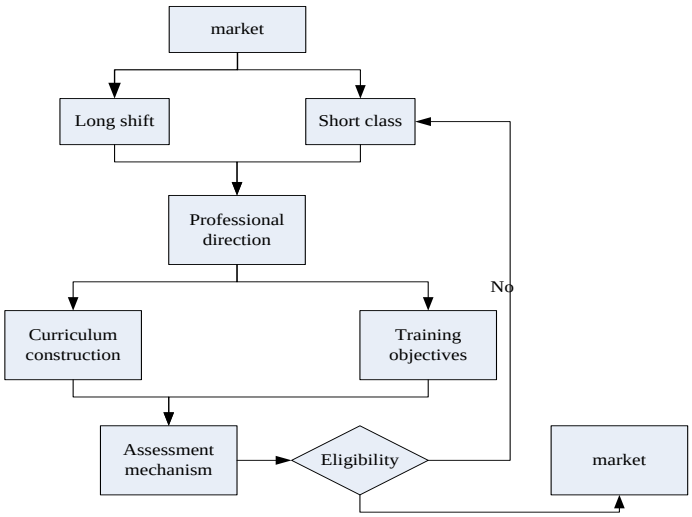

Fig 1. Cultivation model of innovative thinking for computer majors

The long-term "1+1+1" training mode for computer professionals in secondary vocational schools is only for three years, that is, the school system is three years, the first "1" refers to the first year of entering the school (the first year of high school)) In this year, we mainly offer moral education courses, cultural courses and basic computer science courses. At the end of the first academic year, students are divided into classes. Students choose the corresponding professional application direction according to their own interests and hobbies, and regroup the classes. The second "1" refers to the second year of entering the school (the second year of high school). During this year, students

mainly study professional application courses, job courses, etc. The last "1" refers to the third academic year (senior year), during which students are organized to work as internships in enterprises.

"Short class" refers to a short learning time, usually 1 to 3 months, mainly to meet the needs of in-service and non-employed personnel with learning needs, mainly targeted training, such as the use of typists, computers and peripherals Training in the use of office software.

Finally, if there are students who fail to pass the examination upon graduation, as long as the students are willing, they can participate in the school's "short class" training and obtain the corresponding skills and certificates, so as to achieve employment and entrepreneurship.

5. Promoting the Reform of Computer Specialty with the Opportunity of New Engineering Construction

Computer science has a close relationship with strategic emerging industries, especially the reform and innovation of related majors and disciplines. With the basic status of undergraduate education, the construction and development of computer majors has become very important to the development of a school, and it is no longer a problem of the profession itself. To meet the new needs, we must vigorously promote the construction and reform of computer specialty in an all-round way.

5.1. Cultivation Weight of Innovative Thinking of Computer Majors

Based on the "Questionnaire for the Evaluation of Innovative Thinking Cultivation of Undergraduates Majoring in Computer Science", the research topics are further explained to the participants in the questionnaire survey, and their questions are answered. A total of 120 questionnaires were issued to management personnel of undergraduates majoring in computer science in Shanxi universities, teachers engaged in cultivating creative thinking of undergraduates majoring in computer science, various university managers, and school-enterprise cooperative enterprises, and 100 copies were eventually recovered.

The Delphi method was used to summarize the tables filled out by 100 experts according to factors, and the average value of each grading factor calculated by the scoring results divided by 120 was used as their weight. The weight value of the cultivation of innovative thinking in computer science is shown in Table 1, and Figure 2:

Table 1. Weights for training innovative thinking in computer science

	Average value	Standard deviation	Weights
Culture condition	38	3.1	0.38
Subject relevance	43	3.6	0.44
External environment	18	4.9	0.20

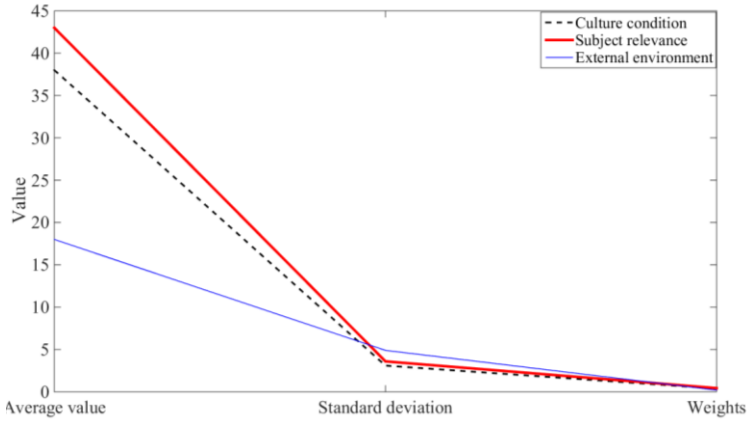

Fig. 2. The results of the training weight of innovative thinking in computer science

It can be seen from the results of the Delphi method that each evaluation index has a certain level of influence on the cultivation of innovative thinking of undergraduates majoring in computer science (that is, the order of importance). Among them, the cultivation conditions are similar to the two secondary indicators of cultivation subjects and their relevance, with weights of 0.38 and 0.44 respectively, and the external environment is 0.20. This sequence reflects that the training conditions and the relevance of the training subject play a key role in the process of developing innovative thinking in universities.

5.2. Current Situation of the Cultivation of Innovative Thinking in Computer Science

The purpose of training computer majors in ordinary colleges and universities in China is mainly to cultivate general-purpose graduates for all industries in the society, focusing on the cultivation of theoretical knowledge and learning methods in the teaching process, while computer industry-related companies need a variety of practical talents , Not only need to have relevant theoretical knowledge, but also need to have innovative and innovative thinking methods, good communication skills, teamwork and self-

discipline ability, etc. The current training methods lack innovative thinking methods training and professional quality education. Professor Tan Haoqiang, president of the National Institute of Computer Basic Education Research in Institutions of Higher Learning, pointed out that the current teaching of computer majors in colleges and universities is too focused on theory and has broken away from the actual needs of the industry. Students lack practical experience, which ultimately results in students unable to meet the actual requirements of the company after graduation.

This paper investigates the teaching situation of computer majors in three undergraduate universities. This time we surveyed the degree of satisfaction of computer students with the current teaching situation. As shown in Table 2, Figure 3:

Table 2. Student satisfaction with the current situation of innovative thinking training

Satisfaction level	Very satisfied	Satisfaction	Basically satisfied	Not satisfied	Very dissatisfied
Satisfaction	40%	23%	10%	20%	7%

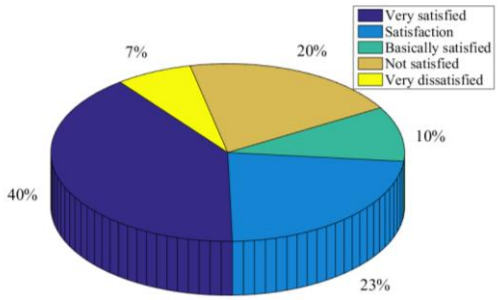

Fig 3. Student satisfaction with the current innovative thinking training situation

According to the data analysis in the figure, it can be seen that 40% of the students are very satisfied, 23% are satisfied, 10% are basically satisfied, 20% are not satisfied, and 7% are very dissatisfied. The above figure shows that the current training model is not conducive to talent training and not conducive to student development.

5.3. Incremental optimization

As one of the core of information technology, computer technology is developing rapidly. Internet of Things, big data, artificial intelligence, mobile computing, cloud computing and so on are changing the production and life style of human beings. The society urgently needs a large number of relevant talents, especially application and

development talents. The development of computer specialty is the response to this new demand.

Some special majors added to computer majors have become new growth points. Originally, there were only two special majors: Intelligent Science and Technology (080907T) and Spatial Information and Digital Technology (080908T). Since 2016, five new specialties have been added, including data science and big data, cyberspace security, new media technology and film production. Basic specialties such as Internet of Things (080905), Software Engineering (080902), Digital Media Technology (080906) will be another major growth point. Whether the addition of basic majors or special majors should meet the forthcoming National Standard for Teaching Quality of Computer Majors, especially the following requirements.

Firstly, we should clarify the social needs of our major. Generally speaking, the construction of new disciplines should aim at training graduates who meet the specific needs of the society, ask for the specialty of industrial demand construction, ask for the content of technological development and reform, and intensify the cooperation between industry and university. As mentioned earlier, the graduates of any major have their own problem subspace, which reflects the main service orientation of the students trained by the professional point and their own advantages. Therefore, the problem space subspace is neither the whole problem space nor the problem subspace of the same major in other schools. This requires the applicants to really understand and aim at the specific social needs of the students they have trained, rather than the general social needs, let alone the "needs" that can be downloaded online. And make it clear that I really want to, and be able to cultivate qualified personnel for this subspace.

Secondly, a reasonable talent training program. First of all, we should have a training goal that reflects the students'specialty and subject advantages and is in line with the "problem subspace". We should make clear the students' professional expectations about five years after graduation, instead of the general goal of "senior talents" who can do everything in the specialty such as "scientific research, engineering development, application maintenance, teaching and management" when they graduate. Secondly, there should be professional graduation requirements to support the realization of training objectives. The graduation requirement of specialty should not be lower than the graduation requirement of National Standard for Teaching Quality of Computer Specialty, and it has its own characteristics. With clear and accurate objectives, the graduation requirements of the major will reflect the characteristics of the talents trained by the major. Thirdly, the curriculum system can effectively support the professional graduation requirements. It is necessary to decompose the professional graduation requirements into indicators, and then assign the tasks of achieving these indicators to the corresponding courses (theoretical courses and practical courses). It is worth noting that the newly-built specialty should have its own characteristics, not a "direction" of computer science and technology specialty, nor simply adding or replacing several new courses on the basis of the original specialty to form a "curriculum system" of the new specialty.

Of course, as a professional education, we must have the basic conditions of classroom, laboratory, experimental equipment and so on.

5.4. Stock adjustment

As mentioned earlier, in 2016, there are nearly 3,000 specialty points in computer specialty, especially about 95% of them have not had more than 25 years' educational history. With the rapid development of higher education in recent years, the following aspects need to be adjusted.

(1) Renewing the Basic Idea of Undergraduate Talents Training

Renewal of the basic undergraduate talent training concept, in order to improve the efficiency and level of personnel training to provide security. First of all, we should return to the original idea of "talent training", firmly establish the basic status of undergraduate education, clarify the responsibilities of teachers, increase the energy input of undergraduate education, consolidate the foundation and avoid "shaking the ground". Secondly, it is to promote the implementation of the three advanced educational concepts. Establishing undergraduate education is not the input of basic knowledge, nor the basic curriculum requirements, but to pursue the output of students'basic ability to solve complex engineering problems in the future.

(2) Constructing a complete continuous improvement system

According to the theory of total quality management, we should establish a system that can be continuously improved and finally achieve perfection. To ensure its effective operation, we should establish three mechanisms: real-time quality monitoring, graduates tracking survey feedback and social overall evaluation. Pay attention to the improvement of training objectives, adjust the graduation requirements according to the background of the times, improve the curriculum system, and constantly improve the rationality and "achievement degree" of these three aspects. Three points need to be paid attention to.

First, evaluation is the foundation. Continuous improvement requires evaluation as the basis, the accuracy of evaluation, the pursuit of data reasonableness and analysis in place. To clarify the object (objective), criteria (basis), executors, appropriate and effective evaluation methods and appropriate evaluation cycle, we should base on effective collection and in-depth analysis of the original data that truly reflects the evaluation object.

Second, mechanism is guarantee. Mechanisms need to be used to ensure the effectiveness of evaluations and the sustainability of improvements. Only by constantly improving the mechanism can we effectively and continuously promote the reform. In view of quality monitoring, graduates' follow-up feedback and social evaluation, a set of standardized processing procedures should be established, and the relevant personnel involved in these processes and their respective roles should be clearly defined.

Finally, improvement is the goal. Applying the evaluation results to the improvement and sticking to the improvement based on evaluation, the improvement is well-founded and effective. "Improvement" based on evaluation emphasizes avoiding "change" based on feeling, experience and personal opinions; without in-depth analysis

of evaluation information and decision-making based on analysis, "change" is likely to be "blindly change"; to pursue "improvement", while "change" is not equal to "improvement".

(3) Define the basic orientation of training the ability of focusing on solving complex engineering problems

It is necessary to determine and implement the basic orientation of undergraduate education for engineering related majors. In order to cultivate students' ability to solve engineering problems with innovative thinking, the talent training plan is designed and implemented, and to evaluate learning output according to this requirement. Gradually rectify the problems of unclear orientation and degraded requirements of some specialty points.

It is especially emphasized here that the cultivation of students'ability to solve complex engineering problems is not simply to let students participate in one or even several complex engineering projects, but to decompose the cultivation of this ability into all aspects of teaching, which can be referred to in reference.

(4) Strengthen and implement systematic design of training program

The design and implementation of the training program must be carried out within the framework of the National Standard for Teaching Quality of Computer Specialty.

As mentioned above, first of all, to determine an appropriate training goal, then to design the corresponding graduation requirements according to the needs of supporting the realization of the goal, to divide the graduation requirements into a series of indicators according to the standards (measurable) which are easy to implement and evaluate the achievement degree, to construct the curriculum system according to the needs of supporting indicators, and to teach the actual theoretical and practical courses. Specific implementation of the corresponding indicators, through the evaluation of the results of teaching activities to prove that the indicators of graduation requirements have indeed been achieved, and through these evaluations found that the need for improvement, forward feedback, to guide improvement.

(5) Steadily moving towards scientific teaching

We should completely get rid of curriculum-oriented education and really move towards output-oriented education. Knowledge should be used as a carrier to teach students the ideas, methods and professional skills of solving complex engineering problems of computer science. These ideas and methods are the contents of computational methodology, including 12 core concepts in the sense of methodology, typical mathematical methods and systematic methods, abstraction of problems, theory and design solving process.

It must be clearly stipulated in the syllabus. Define the curriculum objectives, and the curriculum objectives are related to the graduation requirements (indicators)

supported by them (so, it is no longer just the requirements of knowledge points). The curriculum content should not only include knowledge, but also include the ideas and methods of problem solving. Therefore, the traditional syllabus has been unable to meet the new requirements, especially the "catalogue syllabus of textbooks", far from the new requirements.

(6) Strengthen the Cooperation between Industry and University, enhance the Consciousness and Ability of Innovation and Entrepreneurship

We should further strengthen the awareness of education in training talents for industrial development. In addition to "asking industry needs to build specialty and constructing new structure of Engineering specialty", we should actively promote industry-university cooperation to educate people, keep up with the development of technology, train students to pay attention to social needs, actively guide exploration, and constantly enhance students' innovative, entrepreneurial consciousness and ability. The purpose of the computer contest in Chinese universities is to guide students to select topics for social needs through cooperation between industry and university, to stimulate their intelligence, to exercise their comprehensive use of what they have learned, and to create a service for society.

5.5. Impact of Innovative Thinking Training on Computer Students

This paper conducts surveys and statistics on 200 computer students, and compares their results before and after innovative thinking training. The results are shown in Figure 4:

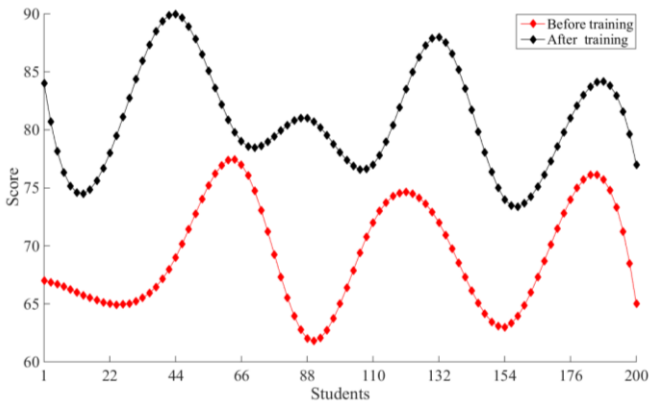

Fig 4. The impact of innovative thinking training

According to the trend and changes of the data in the figure, the academic performance after the innovative thinking training has been significantly improved compared with the performance before the innovative thinking. This also shows that the

computer majors of the innovative thinking training team have a promoting effect and it is their performance improvement. , Stepping stones to successful employment.

6. Conclusion

The new subject reform of computer specialty is not accomplished overnight. It should be carried out step by step. It needs to focus on three tasks: teaching and teaching, practice and innovation, entrepreneurship, localization and internationalization, strengthen discipline construction and change teaching ideas. Engineering technology makes the world more advanced, and science and technology can improve the living standard of the people, and it is the need of the times to train senior computer talents to meet the requirements of new subjects. It is also the mission of our computer professional teachers.

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