

The Research of Water Supply and Drainage Engineering Technology Specialist Talents Training Program Basing on Practical Teaching

Taking Higher Vocational College as an Example

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Abstract—Nowadays, some higher vocational colleges in our country have introduced some norms of water supply and drainage specialist talents training program. And we found some problems after several years; especially we paying more attention to theoretical teaching, the proportion of practical courses is less, which does not meet the requirements of industrial developments and the policies of popular entrepreneurship and popular creativity. The higher vocational colleges should raise the practical and high-skilled talents who adapt to social needs. This essay schedules the talents cultivation scheme of major of water supply and drainage engineering technology.

Keywords—*talents cultivation; water supply and drainage engineering; specialist technology; practical education; teaching system*

I. INTRODUCTION

The education revolution researching team which focuses on water supply and drainage is on the basic of social researches and has set goals of specialist talents cultivation, business professional's specifications and graduates employment posts. At the same time, the team has defined the main problems in specialist teaching, defined the guided methods and general objectives in teaching revolution in water supply and drainage engineering technology, constructed new work-study combination talents cultivation modes. After two years' research, the guided team has formulated the specialist teaching norm of water supply and drainage engineering technology, the specialist talents cultivation scheme of water supply and drainage engineering technology and some basic educating documents such as courses teaching outline.

II. THE BASIC PRINCIPLES OF TEACHING PLAN FORMULATION

- On the aspect of talents cultivation goals and implement ministry of education spirit of 'Principles and ideas of formulating higher vocational college education specialist teaching plans'.

- Talents cultivation plan formulated on the basic of social research and post ability analysis. It is up-to-date and the teaching accords with teaching pattern.
- Talents cultivation plan implements national education policy processes the relationship of professional quality education and overall quality education, the relationship of theory and practice and the relationship of knowledge imparting and ability cultivation. It focuses on the cultivation of students' overall quality to ensure the goal of overall cultivation.
- The scheme targets the social demands as the goal, targets specialist technology ability cultivation and overall quality cultivation as the main line. The basic theoretical teaching targets application as the goal and targets the adequacy to limitation. The teaching of specialist courses should implement the principles of applicability and pertinence.
- The scheme implements the ability cultivation to the whole teaching process. The practical teaching has been enhanced, which guarantees the cultivation of basic ability and basic skills of specialist technology.
- The scheme implements the education theory of work-study combination, and this scheme is as the ways of high-quality specialist skilled applicability talents.

III. CONSTRUCT THE NEW THEORETICAL TEACHING SYSTEM WHICH IS FIT FOR THE GOAL OF TALENTS CULTIVATION AND FOCUSES ON APPLICATION ABILITY

The research team targets the new theoretical teaching system as the key point and the sally port of revolution. It takes example by CBE teaching model and the method of DACUM in curriculum system exploration. According to the skilled post request of water supply and drainage industry in front-line production, regarding technical applied ability and basic quality cultivation as the mainline and the application as the purpose. According to talents cultivation formulation (Knowledge, ability, quality structure), it has developed

ability analysis form and twenty seven curriculum. According to applicability, advance, conformity and practicalness, it has broken up traditional curriculum 'three-old paragraphs' and constructed the new theoretical teaching system which is constituted by four curricula. And then, justify and formulate the previous theoretical curricula and teaching methods.

A. Break through Traditional 'Three-old—Paragraph' Curriculum System

Although the traditional courses accord to progressive teaching principles, including basic curricula, specialized basic courses and specialized courses, it exists some disadvantages for higher vocational education. Firstly, it separates the relationship of these three modes and students are always detached between the theory and application in studying process. Higher vocational education emphasis addressing real issues by applying basic theory. And it is good to cultivate talents technical application ability when regarding application as the teaching theme and cutting through the basic curricula, specialized basic courses and specialized courses.

This cultivation scheme has broken through traditional 'three-old—paragraph' curriculum system, constructed a new theoretical curriculum system constituted by public courses, specialized technical courses and practical courses, and constituted four curriculum group (social cultural science, construction technology and management, operation management, construction designing).

B. Carry out Curriculum Integration

Optimize and reorganize teaching methods and integrate curricula according to applicability, advancement, integration and practicability. And regard the strength of curriculum integration as an important signal.

The setting of traditional three-paragraph curriculum, every curriculum is independent and has its own system and fixes by itself. Doing more researches on basic courses and specialized courses becomes deeper and stronger. Therefore, it spends much time since the studying phrase of basic courses and specialized basic courses. As well as that the theory knowledge they have learnt separates from practical application leads to little time to study subsequent specialized technical courses, and the application ability training is hard to guarantee. For example, the course of 'Water supply and drainage structure' in our major, according to the principle of discipline setting, it should set up 'Theoretical mechanics', 'Material mechanics' and 'structural mechanics' first. These disciplines would takes over three hundreds credit hours, most time are used to basic courses, but after studying these basic courses students still could not do the hydraulic structure designing. This specialized technician requests to understand the structure drawing and construct according to drawing. And the structural specialized technician would accomplish water supply and drainage structure designing. Therefore, we integrate one course named 'Engineering mechanics and water supply and drainage structure' of three laws of motion

and water supply and drainage structure course. And the teaching period is 116 credit hours. And it adds the methods of concrete construction technology and etc.

We have integrated eleven courses to six courses by optimizing course structure according to the idea of integration and reformed the form to methods. It adds to the integrity, specialized technical application and pertinence.

C. Exploit New Curriculum

According to the request of developing application specialized technical persons, we have developed six new curricula such as computer assisted construction management. The technical ability expands to adapt to specialized talents.

D. Strengthen Core Technical Specialized Courses

The key ability of water supply and drainage engineering technical application is construction and organization management ability: Budget and final account ability, construction organization designing, construction technical materials arrangement ability and compiling constructions bidding ability. We have strengthened the curricula which are directive relative to cultivate core specialized ability, added teaching hours and teaching methods which set from over 150 credit hours to 250 credit hours. As well as canceled some courses which are not important to cultivate specialized ability.

IV. CONSTRUCT THE PRACTICAL TEACHING SYSTEM

The new talents cultivation plan is on specialized technical application ability and quality of career quality basis and has constructed combination with theoretical teaching, as well as infiltrated with each other and relatively independent practical teaching system. This system consists of basic experiment skills, construction designing, construction management, overall application ability and every layers, and the cultivation ability is from shallower to deeper and step by step. And it accomplishes by setting trial courses, practical courses, specialized internship, production practice and graduation project. The education plan has added practical teaching hours and the rate of practical teaching to theoretical teaching is 1:0.95, and guaranteed the ability of talents specialized technical ability and the cultivation of career quality.

There are the revolutions of practical teaching link:

- Practical teaching scheme have set trial teaching link and is over 450 credit hours. And according to the request of specialized talents ability, the trial courses have decreased replication experiments, increased applicability and integrity trials. And carry out the form of skill testing. For example, enhance the skill cultivation of computer manufacture and carry out the computer testing regulation. And transform water chemical trials to water quality skill experiment to adapt to the request of career technical post. Construct a system of practical teaching system of cultivating students' basic skills and specialized skills

and the application reforming trial and practical application.

- The practical teaching strengthen practical construction training, test strictly the main craft manufacture skills, carry out qualification certification of construction crew, budget officer, safety officer, quality officer, and water quality chemical analyst. It makes graduates own over one career technical qualification when graduates accept the graduate certification and offers them skills and specialized application ability.
- The course designing scheme sets ten courses(including big project), the overall credit hours is 260 which makes theoretical teaching combine closely with reality, and it cultivates the ability of addressing the construction issues by professional theoretical knowledge.
- Graduation practice utilizes entrepreneurship education resource, carry out vocational school-entrepreneurship cultivation new thoughts, arrange students to internship from the third year to enterprise. In the graduation practice, students not only could contact the overall process of project construction, but also could study relative knowledge and specialized theory. Students will acquire the application ability of specialized technology in construction project practical skills and management when carrying out live-teaching combining with engineering practice.
- Students would complete the graduation design during the practice. The theme of graduation design should be elected in construction projects of internship companies. Finally they will get the graduation design score justified by answering committee. And this method makes our teaching activity be closed to cultivation target and lay a firm foundation to work in the future.

V. IMPROVE TALENTS QUALITY FOR PURPOSE, CONSTRUCT ALL-AROUND BASIC QUALITY TEACHING SYSTEM

New talents scheme constructs the basic quality teaching system combining theoretical teaching, practical teaching, elective courses and the second course pointing at the request of vocational posts to talents basic quality.

- The teaching plan sets up 'Deng Xiaoping Theory', 'Principle of Maxism', 'Mao Zedong Thought', 'Ideological and Moral Cultivation and Legal Basis' and some compulsory courses. It would cultivate and improve the politic theory level of students and educate students moral and legal methods.
- Set 'World History', 'dialectics of nature' and nine humanity elective courses to improve students' cultural quality.

- Carry out high-quality campus activity (including the second course activity), create nice humanity phenomenon, for example, the campus art festival, technology festival, reading speech and various of competition. And to cultivate and improve students' cultural taste and improve students' connoisseurship.
- Integrate quality education to specialized education and transparent quality education to class education and practical specialized education. When cultivating students' specialized education, educate students dialectical materialism education, patriotism, ideology and morality education, exploit innovation education and scientific researching method education.
- Educate students' humanity by setting activities like social practice, social survey and entrepreneurship survey.
- Carry out the form of excellent tutor. Teach students according to their aptitude, strengthen students' personality cultivation, create great environment for students' personality development, create students' creation and innovation.
- Arrange physical class and psychological counseling activity, cultivate students to improve the custom exercise, enhance students' physical quality and psychological quality.

VI. CONCLUSION

The formulation of water supply and drainage construction technology specialized talents cultivation scheme is guided by the spirit of 'The views of enhancing higher vocational talents of Ministry of education' and 'The views of deep higher vocational education revolution employment guided for employment guided' and absorbed successful experience of national college education, which reflects basic features and is with distinct higher vocational education characteristics. These documents are in vital reference value for the teaching revolution of similar national schools.

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