

Reformation on Curriculum System and Course Content for “a Plan for Educating and Training Outstanding Engineering” of Civil Engineering in HYIT

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Abstract— The reformation of curriculum system and course content is one of keys to meet “a Plan for educating and training outstanding engineering” (PETOE) in Chinese higher-education. It is also a challenge that the Chinese higher-education should face to achieve the goal of PETOE, this paper analyzed the nature and connotation of PETOE in Chinese higher-education, and introduced the reformation of the civil engineering in Huaiyin Institute of Technology (HYIT) from the curriculum system to course contents to implement the PETOE in HYIT, it also studied the curriculum structure ought to execute in the curriculum system. Lastly, it discussed the integration and reconfiguration for curriculum system of PETOE to guarantee the successful implementation of the PETOE in civil engineering of HYIT.

Keywords—*Plan for Educating and Training Outstanding Engineering; Curriculum; Curriculum structure; Course system integration and reconfiguration; Teaching reform*

I. INTRODUCTION

The curriculum system is a systematic course which is independent and correlated. These courses are main carriers of university personnel training, they are also many bridges for the talents training goal of university education ideal into practice [1]. There are more than 500 universities setting civil engineering in china. However, the curriculum system is more emphasis on the theoretical study and neglect practice. Although it has certain practices, there are many wide gaps between the current state of civil engineering and original course contents.

The causes of these issues include four aspects as following. (1) Teachers are lack of practical experience. Many teachers pay attention to the theory, but ignore the practice, when teaching is given priority to with theoretical concept and calculation method. (2) Teaching content is outmoded. Many university teaching theory mechanics, material mechanics, structural mechanics, concrete and so on, but it is self-taught or brief introduction for the project frequently encountered problems. (3) Practice is less. Theories is separated from practice, students practice in order to cope with teacher to check, the teacher in the assessment of students without from the student beginning ability to test. (4) Teaching model is unitary. In the original course system environment, teacher supplemented, student teaching mode restricted the students to analyze and solve problem ability, reduce to lose interest in students' learning motivation [2].

With the aims to cultivate theoretical knowledge and application skills of civil engineering professionals, the civil engineering curriculum system is necessity to reform. Curriculum system reform should be based on students' situation and teaching situation to design the characteristics of civil engineering curriculum system [3]. This paper starts from the civil engineering professional talent training target, analysis of curriculum system should possess the characteristics of the elements, put forward modular curriculum structure, and restructure the course system of civil engineering structures.

II. GOAL AND POSITIONING OF THE COURSE SYSTEM

HYIT is a applied undergraduate university, its talents training target in the applied talent, meet the needs of the

outstanding engineers training courses should have the following several aspects of the requirements:

(1) Meet the needs of the civil engineering professional talent training objectives. Majoring in civil engineering students should be able to adapt to various industries all kinds of civil engineering structure design, construction and management, these students should reach the basic requirement of the working knowledge of civil engineering. Meet the requirements for civil engineering professional teaching plan whole optimization, in view of the reform target; it must be within the framework of the overall optimization of the teaching content and curriculum of civil engineering to restructure or adjustment.

(2) Civil engineering course system must reflect the entire inheritance and development of the value of the subject field. Curriculum system design and build to seriously consider the characteristics of the modern civil engineering discipline, the effectiveness of students' knowledge, the course content structure, professional development trend and so on. Compared with the previous engineering talents cultivation, outstanding engineers training involves a wider knowledge and more complicated course system design, So more attention should be paid to logical and systematic curriculum system and teaching content.

(3) Reflect the value of college talent training characteristics. HYIT is a applied undergraduate university, its talent training pays attention to strengthen students' practical ability, talent training goal through the analysis of the characteristics of the curriculum system to reflect. Outstanding engineers training course system of value is mainly manifested in university-enterprise cooperation construction course system.

III. MODULAR CURRICULUM SYSTEMS

The structure of the curriculum system is determined by the curriculum elements and their mutual relations, the different value orientation of curriculum system affect the structure of the curriculum system, different curriculum system structure with different properties and functions, produce different personnel training effect. Modular curriculum system is a modular design with reference to the computer software system designed and compiled by the curriculum system structure. It is composed of several complete course modules of the system, each module consists of several courses, and this course includes compulsory courses and elective course [4].

The main advantage of the modular curriculum system is break through the discipline domain boundaries, then build the different value orientation of curriculum system, meet the needs of the students' all-round development and personality development. Besides, curriculum module is small, it easy to operate and implement, it is advantageous to the module's assessment and adjustment [5].

In view of the civil engineering professional teaching content should be meet the requirements of students training target for knowledge structure, according to the idea of civil engineering curriculum system below, this paper introduces the teaching content of each module.

(1) Structure analysis module. This module is an object with truss structure, the main content for the structure static analysis, dynamic structure analysis, structural stability analysis, structural limit analysis and the structure of the computer analysis.

(2) Load and module structure design standards. This module including three parts: 1. Loads. Introduce the classification of the load and civil engineering under main load, such as gravity, side compression, wind load, seismic load, temperature action, deformation, brakeage and so on; 2. Theory of structural calculation. Introduce the loads, the structure resistance probability model, the basic concept of structural reliability, and the calculation method. 3. Structure design method. The paper introduces the development of structural design method and various structural design method assessments, and the structure of modern design method-probabilistic limit state design method.

(3) The basic principle of structural design. This module mainly includes the basic principle of basic engineering design, fundamentals of steel structures, the basic principle of reinforced concrete structures, the basic principle of composite structure. Focus on mechanical performance and bearing capacity calculation method of various kinds of structure.

(4) Structural engineering design module. According to building structural, bridge structure, the sub-grade and pavement structure, subsurface structure and foundation architecture grouping, respectively introduce the main forms of all kinds of structure, system, design procedure, design regulation, construction requirements and measures.

(5) Structure testing and test module. According to building structural, bridge structure, the sub-grade and pavement structure, subsurface structure and foundation architecture grouping, introduce the content of all kinds of structure test and test, the basic principle of test equipment and methods.

(6) Module structure engineering construction. According to building structural, bridge structure, the sub-grade and pavement structure, subsurface structure and foundation architecture grouping, introduce all kinds of structure of each part of the construction methods and all kinds of construction technology.

IV. CURRICULUM SYSTEM RESTRUCTURING

Carried out in accordance with the modular structure of outstanding engineers training course system design and construction, it should be original in civil engineering professional course system for integration and reorganization, on this basis to complete the construction of curriculum system. Work need to do the following several aspects.

A *Pay attention to the systematic knowledge structure and comprehensive arrangement of knowledge points*

The fundamental principle of curriculum integration restructuring is effective to realize the value orientation of curriculum system, in order to realize the course system of overall value, when making the integration of curriculum system restructuring should pay attention to the systematic knowledge structure and overall arrangement of knowledge

points. To break through the boundaries of various disciplines, the original course and architecture not be tied down, the restructuring of new curriculum. In practical terms, to change the past according to the classification of the humanities science, social science and natural science, break the barriers between the original professional, get rid of the bondage of disciplinary knowledge system; Emphasis on comprehensive course content, select course content in the interdisciplinary and organization curriculum system, pay attention to the osmosis of different subject knowledge, ensure the integrity of knowledge structure; Change pay attention to discipline structure and cause the curriculum carefully and the status of the lack of integrity. Avoid overlapping disconnect and course content, streamlined course category, reduce the required course.

In view of the civil engineering major professional basic course, the three traditional mechanics course, theoretical mechanics, material mechanics, structural mechanics can be achieved by integration of restructuring and form a new mechanics course. The main problem with this three mechanics course: 1. on the course sequence and the arrangement of course content not completely accords with the cognitive law of engineering knowledge. In mechanics of materials to discuss the calculation of stress and strain, just about the calculation of internal force in structure mechanics, with the calculation of the stress first runs counter to the engineering design thinking logic. 2. Teaching is only the abstract theoretical study, not only course between are independent of each other, lack of relations, but also the content of teaching and professional contact is not close. In order to make students better master mechanics knowledge accords to the cognitive laws, the application of strengthening mechanics knowledge in professional practice, to cultivate student ability to solve practical engineering problems. Through the integration of three mechanics course restructuring, new mechanics course will make students master mechanics more effectively, above all, to cultivate students' engineering thinking method and mechanics knowledge ability to solve practical engineering problems.

B Handle the relationship of the compulsory courses and elective course

Required course and elective course is outstanding engineers training course system must be in two classes. Every student must study is compulsory course, it must be purpose is to ensure that students have the basic knowledge and skills, outstanding engineers training for students is the compulsory concrete embodiment of the same requirements. But the diversification of demands for outstanding engineers and students' own needs personalization, its need to universities offer students choose courses according to requirements of the society the opportunity to learn, so, elective courses is outstanding engineers to meet diverse and focus on students' personality development of embodied.

Under the prescribed length of schooling, required course and elective courses is the relationship between the unities of contradiction, the discretion of the proportion of elective course under the influence of several factors: 1. universities graduates can choose employment area. The more extensive service-

oriented graduates in the face of more market choice, the knowledge, ability and quality have greater flexibility, therefore, the need for a greater proportion of elective courses. 2. The diversification of social demand for outstanding engineers, the higher the degree of diversity of professional should be and the higher the proportion of elective course. 3. Personalized level of students. Student groups more personalized level expect more elective courses. 4. Universities can provide need of curriculum resources; it can provide the curriculum resource determines the proportion of elective courses.

C The construction of practical curriculum module

Practical courses are important ways to cultivate outstanding engineers. 1. In the aspect of knowledge, practice course can consolidate learning theoretical knowledge, to deepen the understanding of theoretical knowledge; 2. In this capacity, by using the learned knowledge, practice course to cultivate the students' practical ability, designed capacity, innovation capability. 3. in the aspect of quality, by discovering problems, analyze problems and solve the problem, practical courses can effectively improve the comprehensive quality of students.

Implementation practices for the construction of the course module can form the following several aspects: 1. through the integration of the original curriculum system restructuring, and with the aid of modern education resources and advanced teaching methods, reduce the number of theoretical course class, increase the number of practice course. 2. Through the reform of the teaching methods and teaching methods, reduce the number of hour's course, increase the extracurricular autonomous learning time. 3. Increasing the consistency of design, comprehensive and innovative experiments and training course, to closely combine theory and practice. 4. The students to participate in the activities of actual research project as a practical course, to make the students in the school, or enterprise under the guidance of a mentor for the research of practical engineering project.

D Ability training in the whole course system

Traditional courses to gain knowledge and owns the knowledge as the main goal. Knowledge without application, if knowledge can't to ability, this knowledge will be forgotten, the goal of education will be discounted, therefore, ability to become the main target of the course. Outstanding engineers training course system integration ability training is in the process of restructuring as a clear task to implement, the cultivation of the ability to make in each course, throughout the whole course system.

Students' ability to pay attention to the coordinating role of many subjects, a kind of ability is not always a success, but a continuous training to course and comprehensive effect, in order to make this kinds of capacity can be gradually formed and improve. When the curriculum system integration and restructuring to focus on capacity-building course in relevance, these course form an organic group on capacity-building program.

V. CONCLUSIONS

Based on the outstanding engineers training civil engineering professional course system and teaching content reform, build the ability oriented modularized course system has intrinsic associations, according to the different ability training objectives, adopts the modular curriculum, correlation between the content of the course according to their ability to integrate, form different course modules. Then the corresponding curriculum modules and flexible project provide opportunities for students to apply knowledge.

The modular curriculum system has both the ability to support the integrity, it also has the flexibility of module combination, the content of the course module with the development of construction industry can be adjusted freely, as long as the course module system remains the same, module inside a partial change will not affect the combination between modules, but also to ensure the quality of the curriculum system.

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