

Construction and Practice of Practice Curriculum System of Civil Engineering Based on OBE Conception

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Abstract

In order to adapt to the current demand for talent cultivation of higher education, carrying out the human-oriented education teaching idea, based on the current civil engineering professional practice teaching present situation and existing problems, and build with OBE's conception and double gen fusion of civil professional practice teaching system, this paper by means of modularization in the internship course design experiment graduation design quality feedback, etc, specific measures and implementation plan Effectively optimize the allocation of teaching resources, improve the students have passive learning ability of innovation and entrepreneurship to improve the process of implementation of the program, for the training of civil engineering applied talents to adapt to the development of the national economic belt provided an important reference.

Keywords

OBE concept; Curriculum system; Practical teaching; Applied talents.

1. Introduction

One belt, one road to the new talent training mode, is gradually changing to a new mode of problem oriented talents training. In order to meet the needs of national strategy and national economic development and further develop the new mode of international talent training, the new mode of personnel oriented training is gradually changed into a new indicator of talent cultivation in universities. The four return is to train the country's feelings, innovation and entrepreneurship and serve the "one belt and one way" of the country. The development and construction of regional economy along the line under the initiative and the diversified comprehensive talents serving the economic development of the economic zone have become an important issue that needs to be solved urgently. Therefore, the Teaching Steering Committee of the Ministry of education of the people's Republic of China has issued the national standard for the teaching quality of undergraduate majors in ordinary colleges and universities, hereinafter referred to as the national standard [1] to further standardize the quality standard of personnel training in various majors According to the requirements of national economic development, the steering committee of master of engineering has adjusted more than 50 engineering fields into eight categories of master of engineering. In this context, different scholars are exploring and practicing new education and teaching modes such as "new engineering", OBE and modern teaching means reform [2]. At present, civil engineering is one of the early majors of engineering certification. The core idea of talent training concept under engineering education certification is the output oriented OBE (output based education) education mode. OBE education mode focuses on students' learning output (i.e. what students learn). Focusing on the main line of "defining expected learning output - realizing expected learning output - evaluating learning output", it embodies its core education concepts of "student-centered", "output oriented" and "continuous improvement" [3]. This paper analyzes the teaching objectives and requirements of practical courses, finds out the problems existing

in the practical teaching contents and personnel training programs [4], and puts forward the specific ideas of integrating the curriculum design, optimizing the teaching arrangement, reforming the practical teaching contents, strengthening the assessment and supervision feedback mechanism of practical courses, and constructing the practical teaching framework with accurate target positioning. Practical teaching is an important supporting point for the construction of majors and disciplines in engineering colleges and universities. It is a teaching activity combining knowledge and ability, theory and practice. It is also an important link for students to systematize their knowledge system, to serve the national economic development and to meet the needs of the industry. The national economic development speed is very fast, but the development speed of higher education still lags behind the national economic construction and the development of science and technology. The educational system and teaching content [5] can not fully meet the needs of social development, especially in the practical application of college students, the combination of theory with practice, the systematization of knowledge and the cultivation of innovative thinking. In the practical teaching system, we should pay attention to the improvement of students' practical ability, the perfection and improvement of students' social attributes, and at the same time, we should cultivate and improve students' comprehensive quality, improve their ability in innovation and entrepreneurship, all of which are reflected in the teaching process of the practical link.

2. Current Situation of Practical Teaching System

According to statistics, 62% of engineering students think that the time of practice and practice is not enough, and 45% of the course content is not practical or outdated. Many practical course teachers think that practical teaching is to complete the teaching task according to the outline, and finish the task after reading the relevant reports. This kind of thinking is against the idea of OBE and the idea of student-centered teaching. There are some problems in the content and arrangement of the current experiment, practice and design. The design teaching content is fragmented, the content before and after the practice is not relevant, the practice content is not specific, and the practice outline is not clear about the objectives achieved after the practice, that is, the achievement of the supporting training objectives of the practice courses is not enough. The experimental content stays in the confirmatory experiment, the experimental path is carried out according to the teacher's design, which seriously violates the OBE's educational concept. The simplification of the practical teaching path directly leads to the failure of the innovation and entrepreneurship elements in the curriculum system, resulting in the serious lack of the challenge of the task, the sociality of the environment, the usefulness of the content, and the interaction of the process. Therefore, it can not overcome the bottleneck of "highlighting student center, output orientation and continuous improvement". We can't change from a good teacher to a good learner. The current talent training program, that is, the teaching plan can't really implement the timely update, integration and optimization of professional knowledge, and lacks the practical teaching orientation under the framework of the overall training objectives. Most of the practical courses take the traditional outline as the core, and are independent of each other. As the key link of the transformation from theory to practice, they are not systematic in experiment, practice and design. Discontinuity and obsolescence hinder the penetration among the three, especially the cultivation of comprehensive ability. Specifically reflected in the following aspects.

1. The content of practice and curriculum design lags far behind the pace of current construction and design and scientific research. For example, after the promulgation of the new edition of steel structure code in July 2018, the relevant teaching materials can only be published about 2-5 years or later, and it will take time for students to absorb them. The formation of students' professional concept, professional quality and engineering literacy just

depends on the practice content and Curriculum design content to be updated in time. One belt, one road, big data and other major projects and means have brought about tremendous changes in the specifications of the civil engineering. With the rapid development of China's economy, the norms of the civil engineering have changed dramatically. Some teachers' changes in the new specifications can not be reflected in the practice link in time, and become the biggest development obstacle. New virtual simulation technologies, such as BIM, can not be fully applied in the curriculum design. Using it will lead to the passive situation of students in the early stage of employment, which will lead to serious derailment with international education. Therefore, the renewal and tracking of knowledge become the key link of the optimization and integration of professional courses.

2. The content of practical teaching is lack of coherence and the content demarcation is not clear. The undergraduate major of civil engineering should carry out four stages of practice: cognition practice, survey practice, engineering geological practice, production practice and graduation practice. It should go through seven links of design, including building architecture, foundation engineering, steel structure, concrete structure, engineering cost, engineering construction and graduation design. It should go through five stages of experiment, including mechanics, soil mechanics, building materials, concrete and structure. The carriers of all practical links are different. Students should recognize different carriers after completing the course content of each stage, which leads to the "fragmentation" of practical teaching content. Based on this, the concept of "OBE + " is put forward, that is, the outcome or quality of training students should be added together, which is the destination and focus of talent training. Taking the physical properties and engineering performance of steel and concrete as an example, the The practical teaching contents of "civil engineering materials", "mechanics of materials", "basic principles of concrete structure" and "inspection and appraisal of engineering structure" are both overlapping and repetitive. The practical teaching of each course repeatedly introduces the use of equipment and other contents, which not only wastes limited experimental hours, but also frustrates students' interest and innovation enthusiasm; the knowledge system The incoherence is reflected in the three course designs of "concrete design", "high-rise building structure design" and "building structure earthquake resistance", which involve structural measures, resulting in both repetitive and differentiated parts. These contents should be integrated into the course design, otherwise students will not be clear about the concept of each part, and the practice content calibration is not clear, which is the current engineering class There are common problems in the major. Students do not really understand the specific contents of the practice, have no clear understanding of the objectives of the practice, and have no clear understanding of the special role played by the practice in the five years after graduation. The writing of the practice diary and report has not been systematically trained and guided. They become "mechanical" workers in the practice process There is a serious lack of awareness of innovation and entrepreneurship, and there is a vague understanding of new construction methods and new technologies.

3. The comprehensive design, innovative experiment and systematic theoretical system are not reflected in the teaching process. Although the relevant documents encourage students to independently complete the comprehensive design and innovative experimental results, in the learning process, students cannot effectively link all kinds of curriculum design, especially the problems encountered in the actual project with their own curriculum design. There is a serious lack of ability in raising problems and solving problems, and there is a close relationship between experiments and knowledge system In the aspect of connection, there are some problems such as knowledge forgetting and unsystematic, which restrict the implementation of OBE concept in the teaching process and are far from the concept of innovation and entrepreneurship [4].

3. The Construction of Practical Teaching System

Starting from the learning ability of the students born in the new century, guided by the students' active learning, taking serving the construction of civil engineering field as the short-term goal, taking the students five years after graduation as the medium-term goal, taking the students four years after graduation and five years after graduation as the survey samples, the quality feedback system constructed by the practical teaching system is designated to form a closed-loop mechanism.

Knowledge structure, professional skills and comprehensive quality are taken as the overall function of the scheme. Based on problem-oriented, short board, continuous improvement, timely evaluation and feedback processing, with special cases as the background, the contents of civil engineering practice, curriculum design, graduation design and experiment are integrated coherently, with function realization as the goal, the practical teaching module and system are constructed, and the module function is designed according to the system structure [5]. The details are as follows:

- A. The integration of design content makes the whole curriculum design and graduation design coherent.
- B. Integrate the content of practical teaching and theoretical links, so that the practical links and theoretical links are closely combined.
- C. Integration of practical teaching content and practical engineering, scientific research frontier knowledge. The hardware facilities such as practical instruction and outline are closely combined with the development of the current discipline.
- D. The integration of practice, design and experiment "three in one", and the practical focus on student learning, that is, practice, experiment and other teaching links effectively guarantee the improvement of students' ability to carry out design, construction and other aspects.
- E. Establish an effective evaluation system to evaluate the performance of practical courses, the achievement of students' ability and the implementation of teachers' teaching process, and practically establish a feedback mechanism.

4. Specific Methods and Measures of Reform

(1) ice s to promote student) Implementation plan

After the establishment of the overall idea and objectives, we will visit the design, construction, testing, supervision and management industries, investigate the basic requirements of each industry for graduates' theoretical knowledge and practical skills, and analyze the relationship and gap between the employment requirements and the school's practical teaching. Then, it analyzes the content and arrangement of practical teaching in the current talent training program, based on the cultivation of students' engineering awareness and sustainable development, integrates the practical teaching part, optimizes the distribution of chemical time, and explores the practical teaching framework with reasonable structure, gradual progress and distinctive characteristics, so as to make the teaching objectives consistent with the social needs. The specific architecture is shown in Figure 1

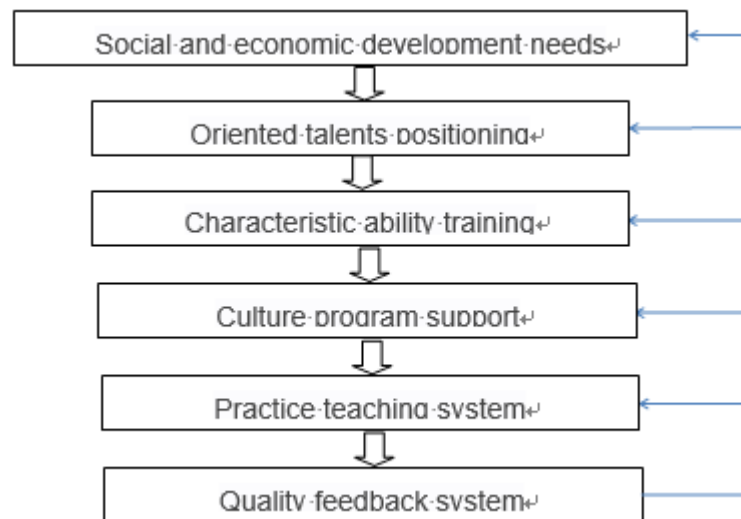


Figure 1. Practical teaching system structure

(2) Implementation method

The reform of practical teaching is carried out in the framework of four modules.

The first mock exam: re defining the output oriented curriculum of practical links to meet the needs of the society.

By organizing the discussion with professional teachers as the main part, enterprise engineers and experts from brother colleges as the auxiliary part, the teaching content of practical teaching course is further determined, the bearing body of course design is determined, the learning unit of group is guaranteed, the consistency and repeatability of learned knowledge are further guaranteed, the fragmentation of knowledge is avoided, and the specific measures to ensure the systematization of knowledge system are put forward. The mode of "curriculum design group guidance teacher group" can be set up when conditions permit. For example, each course design selects different buildings in a group way. From floor design (concrete course design) - beam and column seismic design (seismic and high-rise course design) - foundation design (basic engineering course design) - cost design (engineering cost course design) - construction organization and scheme (construction course design), through a round robin, students can The original fragmented curriculum design is integrated to form a systematic knowledge system. This involves scheme comparison and selection. It is also good to design a frame with steel structure material or concrete material. Of course, the course design of cost can be followed. Finally, through the integration of graduation design, we can complete a good work plan design after graduation, and realize the OBE higher education training goal. The writing of the outline of each practice link must be submitted to the relevant units or teachers in written form for review and discussion, and as an important basis for the writing of teaching materials, syllabus and other teaching documents. Through continuous course design, graduation design and other means, the knowledge of each course can be coherent. The constant designer, the constant design object and the changing instructor are conducive to the students' ability of finding, analyzing and solving problems by analyzing the phenomena and conclusions from the data, i.e. the attainment of training objectives required in higher education and the adaptability to social development.

The second module: Based on the improvement of students' diversification ability, the implementation of the three course integration of the practical curriculum content with "double creation" as the engine is realized.

Through the discussion of professional course teachers, it is further determined that the content of practice is closely related to the knowledge of experiment, design and other courses.

For example, "production practice" should be closely related to "civil engineering construction course". After the completion of the design and theoretical study of the construction course, production practice should be carried out. As a pre practice instructor, the course teacher has the obligation to make the objective and content of practice Integrate into the classroom. The design of construction can be combined with the content of production practice. Students can complete a local small design on campus, simulate the practice state of the Design Institute, if conditions permit, they can reply, optimize the scheme or simulate the bidding process, so that students can enter the "working state" in advance. It can effectively change the state that students are blind and unable to start in the process of construction or design after graduation, and combine the curriculum design and practice closely, so as to achieve the goal of the curriculum. In addition, the virtual simulation laboratory can simulate bidding, feasibility study report, etc., so that students can enter the working state in advance, have a clearer understanding of career planning, and improve the teaching ability of general education. Comprehensive design experiment and new technology topic can be closely linked with practice. The practical problems encountered by students in production practice, including technical and scientific problems, can be brought into comprehensive design experiment, can be solved through experiment in practical training or new technology topic, and can be solved through discussion of new technology topic, so as to integrate practice, design and experiment. The three are united. From the perspective of graduation design, the traditional graduation design is basically based on the book, and the plagiarism among members, upper and lower students, and between schools is inevitable. In order to further prevent and control the occurrence of such things, guided by innovative design topics, guide students to simulate the graduation design of actual projects and working conditions, with a variety of "design + construction", "design + cost", "BIM + construction", etc Turn the topic into a guide, solve the above teaching bottleneck problems, truly realize the three in one mode, and then improve the teaching quality efficiently, that is, the achievement of training objectives and the satisfaction of society and students.

The third module: breaking away from traditional teaching imprisoned and building practical teaching system of civil characteristics.

Increase the traditional weeks of production practice so that students can accept the comprehensive practactivities. Production practice can effectively link up with the graduation project, and can flexibly carry out practice and graduation project in the employment unit, so as to enter the working state as soon as possible. The curriculum design instruction clearly requires to include new standard content, new construction technology, domestic and foreign research frontier issues. The matching handout and exercises must be updated accordingly. If it is necessary to publish a series of guidance, teachers, scientific research institutes, construction units and other personnel from brother colleges and universities can be invited to participate in the compilation of teaching materials. If there is no condition, handouts can be compiled, that is, the support of teachers and the achievement of training objectives.

The fourth module: to establish and perfect the effective mechanism of students' learning evaluation, to establish the mechanism of teachers' teaching quality evaluation.

The performance evaluation of students' production practice, curriculum design and other practical links breaks the traditional evaluation methods, such as curriculum design, which includes the usual attendance, usual questions, drawing quality, calculation results, experience, innovation and other evaluation contents, and evaluates students' learning status through a comprehensive evaluation method. Establish a reasonable index system for students to evaluate teachers, establish an index system for evaluating students' ability achievement, comprehensively evaluate teachers' teaching situation according to the weighted coefficient method, and give some feedback to teachers at the professional level to ensure the continuous and effective improvement of teachers' teaching methods, and make a secondary evaluation on

the improvement of the professional director and the person in charge. Form a tight closed circuit.

The four modules are hierarchical and step-by-step, in line with the cognitive law, meet the teaching objectives, and take the cultivation of innovative quality as the main line. It has become a powerful guarantee to cultivate a high-quality professional with clear professional concept, comprehensive professional quality and profound engineering literacy, that is, the effectiveness of the teaching system and the satisfaction of users.

5. Reform Effect

The student-centered practical teaching system of civil engineering ensures the quality of personnel training, realizes the talent orientation and ability training in the training program, studies the role and position of practical teaching in the training of civil engineering talents and the formation of students' innovation ability, builds a scientific practical teaching framework, adjusts the practical teaching program, integrates the practical teaching curriculum, adjusts the teaching plan, and proposes to We should set up a talent training program with reasonable structure and distinct characteristics, build an innovative practical teaching system, integrate practical teaching content, innovate practical teaching management, and ensure the continuous development of practical teaching for four years. Basically form the first grade to learn the relevant theoretical knowledge, the second grade to understand the basic components, the third grade to independently design the relevant components, the fourth grade to put forward innovative design; explore step-by-step, distinctive practical teaching framework system, build theoretical innovation, practice prominent, clear division of labor practical teaching management system, so as to achieve the cultivation of "integration of mass entrepreneurship and innovation" Use talents.

6. Conclusion

Through the integration of the contents of different curriculum designs, the integration of practice and different teaching systems, the improvement of students' systematic knowledge level, the close logical relationship between the teaching links of practical courses and production construction, design and scientific research, the improvement of students' comprehensive quality, and the improvement of students' Innovation and entrepreneurship through virtual simulation, comprehensive experiments and other practical teaching means. Ability to improve students' confidence in analyzing and solving complex engineering problems by reforming the content of graduation project. Establish the evaluation index system of students and educators to ensure the quality of practical teaching. The construction of the practical teaching system promotes the cultivation of civil engineering talents to achieve the five degree teaching objectives. The practice of the practical teaching system is guided by the students' learning objectives, the output that the students can have the feelings of home and country and serve the economic development after graduation, and the main measures that the whole process of education and teaching can continuously improve and perfect their own system are taken in the development of higher education. Do an important groundwork for the reform of engineering practice teaching system in colleges and universities to provide important basis and reference.

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