Integrated Curriculum Design Reform of Civil Engineering Management Discipline Based on Inter-disciplinary Professional Training

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Abstract. In view of the shortcomings of the current civil engineering management discipline, this paper investigates the necessity of the course design reform. Based on the analysis of basic occupation requirements of civil engineering management discipline, the basic ideas and implementation strategies of the integrated reform of curriculum design system are proposed, which can not only improve the students' overall understanding of knowledge and skills, but also enhance the system of student learning.

1. The necessity of curriculum design reform in civil engineering management discipline
In order to cultivate inter-disciplinary professionals in civil engineering management discipline and improve students' learning ability and innovation ability, many professional curriculum design courses have been proposed, such as project valuation, project management, engineering economics and engineering contract management. Besides, the proportion of practice session is also increased in some courses. The teachers of each course have accumulated years of experience. Their own curriculum design task objectives, content and basic requirements are very clear. These conventional teaching methods have played a certain role in promoting the students' practical ability and the coordinated development of overall quality.

However, the design/practice session of these courses are set by a separate course and artificially split the overall design of a project into pieces, which leads to the lack of whole understanding of professional knowledge and skills during the students' learning process. The comprehensive use of the ability of knowledge is also poor. Owing to the emphasis of integrity and comprehensiveness of each course in the current curriculum design system, it is unavoidable to repeat the design tasks. This not only takes up more students' spare time and aggravates the students' learning burden, but also causes students to lose interest in learning and reduces their learning efficiency [¹].

In order to improve the students' learning initiative, enhance students' practical ability and achieve the training objective of civil engineering management discipline, it is of vital importance to carry out the integrated reform of curriculum design based on project construction procedure.

2. The content of systematic course design for civil engineering management discipline

2.1 The requirements for practical ability of civil engineering management professionals
Civil engineering management has the characteristics of composite and technical applicability, which is a highly practical discipline. The investigation of job requirements of civil engineering management graduates shows that, one of the characteristics of engineering management specialty different from civil engineering is the cross composite capability which is embodied in the following aspects: the preparation of budget ability, project cost management capabilities, project management capabilities, project contract management capabilities and engineering software application capabilities [2]. Through the planning of the relevant curriculum design, the path to cultivate these capabilities is shown in Figure 1.

![Figure 1. Training path of inter-disciplinary ability for civil engineering management](image_url)

### 2.2 The content of course design based on project construction procedure

As a student majored in civil engineering management, the future work may involve in the entire process of project management. Therefore, it is necessary to strengthen the practical teaching of economy and management based on civil engineering technology and strengthen the professional characteristics. According to the requirements of civil engineering management professional personnel, the contents of the related curriculum designed in the training program are as follow: the prophase project planning, feasibility study report, bidding, construction planning, budgeting, reporting, project settlement, in the preparation of project approval, contract management documents, completion report and other practical aspects [3]. These practical links seem complex and independent, but they are closely connected which covers the entire process of engineering construction. Integrated reform of curriculum design for civil engineering management discipline is aimed at letting students jointly design and implement a complete project according to the engineering construction procedure, and carry out relevant curriculum design in turn, as is shown in figure 2.
3. Implementation of integrated curriculum design reform for civil engineering management discipline

3.1 Rational arrangement of curriculum design in combination with professional training plan

Course design is usually arranged in a few weeks to complete the concentration of time, so the sequence of the curriculum design is arranged based on the construction program of the project. Considering the requirements of the professional knowledge between the curriculum design tasks and the intensity of the students' tasks, the steps are arranged in different periods. In this way, the early design results can be used as guidance for later stage design, and during the later stage of design, we can also feedback on the design results and improve the design results, as is shown in Figure 3.

3.2 Topic selection of curriculum design

Considering the integration of curriculum design, the task is arranged according to the implementation of a specific project in the professional training plan. In the topic selection of the course design, we should take engineering project as guidance and practical engineering as the carrier to reappear the real
situation of the actual project. Therefore, we can choose real and specific small projects, such as ordinary commercial housing, apartments, office buildings or buildings, as the basic data of curriculum design, which facilitates the students go through a complete construction process.

3.3 Formulating a series of guidance books on the improvement of curriculum design
To carry out the integrated reform of curriculum design, we must determine the specific content of each course design and unify the basic contents for the design of various courses. The design results of the previous courses are used as the basic data for the follow-up course design. It is necessary to strengthen the coordination and cooperation among the teachers of the course design, so that the teachers can recognize the effect of the integration reform. Therefore, it is necessary for the teachers to be well coordinated and select the appropriate project as the basis before the formal implementation. Each teacher defines the specific goals, contents, requirements, schedule, and sets out a complete set of guide books for the course design. A series of guidance books also enable students to define the role of a course design in the whole process of the project construction and the sequence of correlation in the beginning.

3.4 Organization of curriculum design
In addition to training the students' professional practical ability, a more important purpose is the training of comprehensive quality. It is also mentioned that the management of the entire process of the project requires professional interpersonal communication, teamwork and coordination. Especially when facing a complex engineering design, the teamwork and cooperation ability is particularly important. During the process of design, the principle of "fine speaking, more practice, diligent thinking and group discussion" is adopted to let students design by themselves. Therefore, the integration of curriculum design requires the completion of the various courses design. The members of each group are around 5 students. Students with different level should try to achieve balanced distribution in each group. Each group needs a team leader. The main task of the group leader is to determine the overall design plan through a panel discussion, and to assign specific tasks to each member of the group. The leader of the group can be changed as a result of the different curriculum design, so that every student is possible to play the role of team leader and cultivate coordination ability. The members should work as a team instead of a group of people, who make efforts to create a learning atmosphere of "group comparison, learning, catching up, helping and exceeding" and cultivate students' teamwork spirit and practical communication ability.

4. Conclusion
The work of civil engineering management runs through the entire process of project decision-making, planning, design, preparation, operation and operation, and carries out overall planning, cost, time limit, quality control and organization coordination to achieve the expected goal of the project. The integrated curriculum design reform of engineering management can better enable students to understand the whole process of project construction, to get better professional and systematic training, and to improve their practical ability and comprehensive quality.

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