

The Study on Teaching Pattern of Progressive Graduation Design in Civil Engineering Specialty

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Abstract—Progressive graduate design is one of the graduate design teaching patterns that the graduate design results will be the deepening and improvement of the series of curriculum designs results. The teaching pattern can improve efficiency and meet requirements of the design depth, and is advantageous to the grasp of the Graduation design content will be the deepening and perfect professional knowledge system and enhancement of the practice ability of students, and the enhancement of the teaching responsibility and the formation of the teacher groups.

Keywords—graduation design; teaching pattern; teacher groups

I. INTRODUCTION

As one of the most important practical teaching processes in undergraduate course stages, the graduate design has the characteristics of practicalness and comprehensiveness, and is the transition period between the study of knowledge and engineering practice. The teaching effectiveness of the graduate design directly decides whether the talent training target can be achieved, and is highly extensive attention and research [1-4]. At present, under the background of excellent engineer education, how to improve the training mode and management mode of graduation design in the domestic universities have become the core theme of the teaching reform of the graduation design and received extensive attention [5-7].

II. THE EXISTING PROBLEMS OF THE GRADUATE DESIGN

A. Not be the attention by undergraduates

At present, some undergraduates pay no attention to the graduate design and insufficiently understand the significance of the graduate design, because the main employments of the civil engineering undergraduates are the construction company, the supervision or management entity, and less of them can directly engage in the engineering design work. However, the graduate design teaching objectives are unable to achieve if only the construction organization design and documentation project budget are carried.

B. The unreasonable time distribution in the graduate design stage

The arrangement of the graduate design is conflict with the postgraduate reexamination, the employer interview and the national and provincial civil service examinations in time. When the graduates begin to pay attention to the graduate design in May, they often feel time insufficient and have to complete the graduate design work in a hurry.

C. A lot of the repetitive training work between graduate design and course design

For training the students' application ability of the theory, there are a series of course design, including building architecture curricula design, concrete structure curricula design, steel structure curricula design, building structure curricula design, construction organization curricula design and budget estimate and budget of construction project curricula design. In these curriculum design process, the basic methods and principles of civil engineering design have been training, but design depth can not satisfy with the engineering requirements. In the graduate design stage, these work that had been training in these curricula designs are repeated, more time and effort will be wasted, but practice ability training, such as the professional standards and software learning and budget documents, will be ignored, and the inferior quality and effect will be lead. These restrict the improvement of the students' comprehensive practice ability.

D. The problems of the instructors of the graduate design

At present, the majority of graduate designs are completed under the guidance of specialized teachers in the school, and a few of graduate designs are completed under the guidance of the technical staffs in the engineering entities.

The technical staffs of the engineering entities, who have more practical experience than the specialized teachers in the school, and pay more attention to the engineering standardization and construction, and are not interested in basic calculation theory and method, are very busy doing their jobs and have no more time and enough experience for the guidance of graduate design. In addition, it is difficult to communicate the design method between teachers and students for the wide gap of specialty ability in them. Thus, many students who to finish their graduate design in the engineering entities feel that less harvest have been got in.

The specialized teachers in school, who have enough theoretical knowledge and teaching experience, can put more time and effort into the graduate design work, but there are prominent differences in all the teachers. Some teachers with the broad engineering experience can combine the design theories and practices very well, however the teachers with less engineering experience can not effectively solve the problems appeared in the process of graduate design because of their less knowledge in design standard, engineering materials and structural treatment. Therefore there are huge differences in teaching effect of graduate design that guided by the different teachers.

III. THE STUDY OF TEACHING PATTERN OF THE PROGRESSIVE GRADUATE DESIGN

The progressive graduate design refers to a set of graduate design teaching system which links all specialized courses and course designs together around a special project. Here, the progressive graduate design will be introduced from civil engineering.

A. The establishment of the progressive graduate design

At the traditional teaching system, the specialized courses, course designs and graduate design is the independence teaching process, and the graduate design is the summary and no deepens of the specialized courses and course designs only. At present, the civil engineering undergraduates' employments, such as the construction company, the supervision or management entity, require more comprehensive professional knowledge and practical ability, and the progressive graduate design made up of the series of course design can effectively improve the efficiency of graduate design and achieve the teaching goals of graduation design that offer systematic and in-depth training for the comprehensive professional knowledge and practical ability, and the traditional graduate design do not so.

The progressive graduation design changes the fragmented state between different the specialized courses and the course design in the traditional graduate design. In the process of the course designs, students complete entire design process independently around a practical engineering, including architectural design, structure design, construction organization design and project budget, and in the graduation design phase, they will further perfect their previous design result by the application of the design specifications, codes, design drawings collection and design software. The progressive graduation design not only makes the students have a comprehensive reviewing on professional knowledge in system, but also excites and improves the students' enthusiasm and interest for the learning.

B. The characteristic of the progressive graduation design

- Exciting and improving the students' enthusiasm and interest for the learning

In the four years of university study, the second and third year is the gold period for the undergraduates to study professional knowledge. In this stage, the students have not graduate-study admission and employment pressure and can concentrate on the study of professional courses, so their

learning autonomy is strong, initiative, self-consciousness and learning efficiency is better, and they can high quality complete their design tasks in a short time.

In the progressive graduation design teaching pattern, each course design work is the continuation and perfection of the preliminary course design work, so students are familiar to the project. Teacher can encourage the students to improve their design by the way of homework and discussion in the teaching process of professional course, and all of the results can be the summary in the course design process. Through the teaching pattern, students' projects will be gradually completed in the process of professional course learning and the series of courses designs. In the graduation design stage, the students already have comprehensive awareness and understanding for their own projects. This kind of teaching pattern can not only improve the learning efficiency and effects of professional knowledge, but also help students develop good study habits and cultivate students' self-learning ability.

- *Improving students' engineer practice ability*

In the process of progressive graduation design teaching pattern, the results of each course design will be the foundation of the next course design, the attention of teachers and students will be improved. Beginning in the graduation design, the students can quickly enter the working state of graduate design because of the familiar for their project and the conceptual design, structural arrangement, analytical model, construction scheme and construction budget having been finished, so they can directly start the work of the building construction drawing, structure analysis, and structure construction drawings, construction scheme to deepen and budget refinement. At the same time, the guide teachers of graduation design can require students to focus on the solving of the practical engineering problems, such as the selection of building detail construction, the understanding of design specifications, the design of scaffold and formwork, the arrangement and adjustment of engineering implementation schedule. These can effectively enhance students' engineering practical ability.

- *Strengthen responsibility and team consciousness of the guide teachers of graduation design*

At present, for the lack of the professional teachers with rich engineering experience, the majority of the guide teachers of graduation design can provide comprehensive and integrated guidance for students in the process of graduation design, so the traditional teaching pattern of graduation design is the disadvantage of comprehensive grasp of professional knowledge and the improvement of the engineering practice ability. In the progressive graduation design mode, due to the results of the course design will be the foundation of the next curriculum design, guidance teachers of the course design and students will pay more attention to the course design process, and lots of preliminary basis work of graduate design, finished in the courses design, can't existence big quality defects because of the professional teacher's guidance, then the guidance teachers of graduation teachers can know the students' learning status through the course design results and give more targeted guidance. Meanwhile the guidance teachers, including the graduation

design guidance teachers and all course design guidance teachers, need carry out necessary communication in the guidance process of graduation design to improve the teaching effect of graduation design, which is helpful for the comprehensive improvement of engineering practice ability of professional teacher and the formation of the teaching team, and will play a good role in promoting the quality of graduation design and the teachers' ability in comprehensive practice.

IV. NEED TO PAY ATTENTION TO PROBLEMS IN THE PROCESS OF THE PROGRESSIVE GRADUATION DESIGN

A. *Attention to raise the engineering practical abilities and attitude towards graduation design of guidance teachers*

As one of the advantages of the progressive graduation design, professional teachers can give full play to their profession advantages in the process of graduation design. In the professional course teaching and course design, the guidance of the professional teachers ensures the quality of course design result. Only the results of the course design achieve enough depth, it can be basis for the follow-up course design and graduation design course design. Therefore, improving the professional teachers' professional ability and teaching attitude is the key to ensure the teaching effect of graduation design, and the senior technical staff of the engineering entities can be engaged to train professional teachers' practical ability at a pinch, or profession teachers are directly involved in the design and construction of the project. The engineering and technical personnel of the engineering entities can be employed directly for guidance in the course design if possible.

B. *Specify the appropriate task goals of course design*

Being the foundation of the next course design, the results of course design need specify the appropriate task goals unless the next teaching links will not be carried out smoothly. Therefore, the teaching pattern of the progressive graduation design requires that all professional teachers should discuss the appropriate design goals of every course design together and the requirements should be documented, and the guidance teachers must guide the curriculum design in accordance with the requirements of these documents. Determining the task goals of course design, the time situation of the course design must be considered, and the too high requirements or armchair goals will be difficult to be achieve.

V. SUMMARY

As the teaching links of the comprehensive summary of professional knowledge and the integrated training of the expertise skills, teaching effects of the graduation design will directly affects the school teaching quality and students'

future work ability. In the tradition graduation design teaching pattern, students spend a lot of time to repeat the basic training that have be done in the course design, and have not enough time for the deepen and perfect of their project, it is not conducive to improve the students' professional ability and the quality of the graduation design. At the same time, the time of the graduation design is in conflict with the time of the postgraduate re-examination and job interviews, these scatter the students' time and energy, so even for good students, it is also difficult to complete their project perfectly in the period of the graduation design. In addition, the shortage of the professional teachers' comprehensive practice ability also affects teaching effect and the achievement of the graduation design.

This article proposed teaching pattern, the progressive graduation design, combines the course teaching, course design and the graduation design reasonably; it can not only solve the problems in tradition graduation design teaching pattern but also improve the efficiency and quality of the graduation design. At the same time, the teaching pattern can inspire the students' learning enthusiasm, help students to form professional knowledge system and improve their engineering practice ability, and it is conducive to enhance the professional teachers' teaching responsibility and to form the teaching team.

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