Teaching Research of on YJK Structural Software Application Course Based on Engineering Education Accreditation

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Abstract. The certification of engineering education requires that teaching should focus on students' ability, and the determination of the curriculum aims should meet social needs. According to the above idea, YJK Structural Software Application course for civil engineering specialty is studied. Firstly, combined with the orientation of applied university and the results of social survey, the capacity requirements of structural design engineers are determined, and then the ability objectives of the course are determined. Then according to the teaching objectives, the specific teaching contents and corresponding teaching methods are determined. Finally, the core idea of continuous improvement is embodied in the formulation of teaching achievement goals and the course assessment method of the final examination.

1. Introduction

Since 2017, civil engineering professional evaluation has been included in the overall framework of national engineering education certification, marking that professional evaluation will be carried out in strict accordance with the core concepts and evaluation standards of engineering education certification. Student-centered is one of the three core concepts of engineering education certification. It is required that in the process of talent cultivation, the quality and ability of students should be taken as the center. Taking the course teaching as an example, all teaching contents, teaching methods and teaching assessment must support the corresponding ability objectives of the course. At the same time, as one of the five evaluation standards of engineering education certification, social demand degree points out that the design of curriculum system and the determination of curriculum teaching should be participated by enterprises or industry experts, The curriculum system design and teaching are closely around the students' ability goals, indicating that the determination of curriculum corresponding ability goals should also meet the requirements of social needs.

Therefore, some teaching researchers in China have studied the teaching of this course. Wei Zhengwei[2] combined with relevant national standards, analyzed the meaning and value of relevant parameters when using SATWE submodule in YJK structural software to calculate internal force and reinforcement, and the meaning of relevant key index parameters after calculation. Wang Na [3] pointed out that the teaching of the course is closely related to the engineering project, and the project teaching method is put forward. Huang Lifen [4]discusses the per-class teaching preparation, course teaching and assignment arrangement of the course, and points out that the pre-class teaching teachers should prepare the course from the perspective of the students, understand the students' mastery of the course, and Le Jinfa[5] puts forward the teaching mode of "four stages", namely, the course teaching Through rich practical teaching, we can improve the teaching quality, Lu Lijun[6]pointed out that it is generally easy for middle school students to teach the PMCAD sub module, SATWE sub module and jccad sub module of YJK structural software The existing problems, such as load input, parameter value, etc. the rich research results of predecessors provide valuable reference value for the teaching of YJK structural software application course, but the research is mainly carried out from the teaching content, teaching methods and problems in teaching. The research idea is not based on the professional certification concept of engineering education. Therefore, this paper will be based on engineering education The

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core idea and evaluation standard of professional certification are studied on the ability target, main teaching content, teaching implementation and teaching assessment of YJK structural software application course.

2. Capability Requirements of Structural Design Engineer Based on Social Demand

The social demand degree of engineering education professional certification requires that when determining the curriculum system and content, social research should be carried out to make it consistent with the ability of industry demand, and the determination of ability is bound to be related to school positioning and professional posts. For applied universities, the main positions of graduates majoring in civil engineering are structural design engineer and engineering front line management engineer. Therefore, combined with a number of structural designers who have been engaged in structural design for more than ten years, have the title of senior engineer and national first-class registered structural engineer, the ability of structural design engineer is investigated. After the summary, the ability requirements are as follows:

(1) Familiar with frame structure, frame shear structure, shears wall structure, masonry structure and other structural systems;

(2) Be familiar with the independent foundation, strip foundation, raft foundation, pile foundation and other foundation forms;

(3) Be familiar with the mechanical concepts of various structural members;

(4) Familiar with the requirements of common structural design specifications;

(5) Be able to use structural design software for structural modeling;

(6) Be able to analyze and judge the calculation results of structural design software Break off;

(7) Be able to draw structural construction drawings

3. The Ability Target of YJK Structural Software Application Course

According to the ability requirements of the structural engineer, especially the ability requirements (4) - (8), and combined with the suggestions of structural designers, the ability objectives of YJK structural software application are as follows:

(1) Familiar with YJK structure software operation ideas;

(2) Be able to use structural conceptual design for the preliminary design of structure;

(3) Be able to preliminarily arrange the main stressed components of the structure according to the principle of coordination with the building layout;

(4) Be able to carry out the preliminary layout of secondary components according to the specification requirements;

(5) Be able to preliminarily determine the cross-section size of the member according to the recommendations given in the code and the bearing range of the member;

(6) Be able to use pmpk structural software to model the preliminarily determined structural scheme;

(7) Be able to determine the meaning and value of parameters used for structural calculation in PK-Pm structural software by using the knowledge of norms and relevant theoretical courses; (8) be able to analyze the response of structural mechanics by using the knowledge of norms and relevant theoretical courses;

(9) Be able to use the National Atlas to understand the component reinforcement drawing given by YJK structural software;

(10) Be able to use norms and relevant theoretical course knowledge for independent foundation design under the column

4. Main Teaching Contents of YJK Structural Software Application Course

According to the ability target of YJK structural software application course, the main teaching contents of the course are determined as follows: According to the course ability goal (1), it is

pointed out that the structure module of YJK software mainly includes PMCAD module, SATWE module, Tat module, wall beam column construction drawing module and jccad module. Then it points out the specific use of each module. On this basis, it points out the correlation between each module, that is, the overall idea of YJK structure software. According to the ability objective (2) of the course, combined with the course of structural design of high rise buildings, the course of aseismic design of buildings and the code for aseismic design of buildings, it is pointed out that in the conceptual design of structures, it is necessary to understand the internal implication and application of structural plane irregularity, vertical irregularity, and deformation joint setting, According to the ability objectives (3) and (4) of the course, and in combination with the course of concrete structure design, the course of high-rise building structure design and the code for design of concrete structure, it is pointed out that the layout of building construction drawings should be coordinated, the layout of frame beams should form a horizontal two-way bearing system with frame columns, beams should be arranged under partition walls, and when the floor area is large Secondary beams shall be arranged and applied, According to the course ability goal (5), and in combination with "high rise building structure". A design course, concrete structure design course, seismic design of buildings. According to the course ability goal (6), firstly, combining the concept and content of "structural calculation diagram" in "structural mechanics", "concrete structure design" and "structural design of high-rise buildings", this paper points out the specific idea of "building structural model by using PMCAD module", then points out the specific corresponding relationship between each component of PMCAD module and this idea, and then points out that Specific operation of each component of PMCAD module. According to the course capability objective (7), it is pointed out that the most relevant option in "SATWE module or Tat module" is "supplementary definition of analysis and design parameters", and the physical meaning, value and application of each parameter in this option are explained in combination with relevant courses, Then according to the course ability goal (8), combined with "concrete structure design" and "high-rise building structure design" and other courses, the paper points out the specific content of "SATWE module or Tat module" about the structural mechanical response, such as axial compression ratio, whether the beam exceeds the reinforcement, cycle ratio, displacement ratio, deflection ratio, shear weight ratio, stiffness weight ratio check, etc., and analyzes the reasons and solutions, according to the course ability goal (9), the paper first explains the drawing rules of beam flat method construction drawing, column flat method construction drawing and shear wall flat method construction drawing in detail in combination with the drawing rules and structural details of overall plane representation method of concrete structure construction drawing. Then, it describes the operation of drawing wall beam column construction drawing by using the wall beam column module, and reads each construction drawing, the course of concrete structure design principle points out the design steps, calculation methods, checking calculation contents and construction drawing requirements of the reinforced concrete floor slab. On this basis, it describes how to use "drawing structure plan" in the PMCAD module to input known conditions, how to select calculation methods, how to view checking calculation contents and how to draw slab when designing reinforced concrete floor slab Reinforcement diagram. According to the course ability goal (10), first, combined with the course of foundation engineering and the code for design of building foundation, it points out the known conditions and design contents that must be provided when designing the independent foundation under the column. Then, it describes how to use jccad module to determine the known conditions, how to view the design results and draw the foundation construction drawings.

5. Teaching Implementation of YJK Structural Software Application

It can be seen from the teaching content of YJK structural software application that the course involves many and wide theoretical knowledge, strong correlation with engineering, strong software operability, and in the actual teaching, the number of hours is often 24 hours, resulting in the limited engineering type of teaching content. In order to better improve the teaching quality, the following differences are adopted for different teaching content in the actual teaching the same teaching

method:

(1) Knowledge induction: for the YJK structural software overview, structural conceptual design, structural layout scheme, the preliminary determination of component section size, as well as the theoretical course knowledge related to each module of YJK structural software and the teaching content specified in the specification, it focuses on the summary and arrangement of theoretical knowledge. Therefore, the knowledge induction method is adopted and the teaching is carried out in the form of PPT and PDF.

(2) Project teaching method: considering that the theoretical knowledge of the course is for the purpose of serving engineering design, and the purpose of software operation is to turn design idea into construction drawing through software, therefore, in the teaching content of structural conceptual design, structural layout scheme and preliminary determination of component section size, a typical engineering case and corresponding complete construction drawing are introduced and applied In addition, in the teaching content related to software operation, we continue to take this typical project as a case, and complete the software operation with the knowledge and specifications related to each module of YJK structural software that was taught by knowledge induction before

(3) Interaction method of classroom teaching: considering the wide range of knowledge of the course design and the corresponding specific ability objectives of each teaching content, in order to improve the teaching quality, in the teaching link, the interaction method of classroom teaching in the form of asking questions to students and students to teachers is adopted

(4) Student practice: considering that one of the purposes of this course is that students can operate YJK structure software skillfully, which has strong practicality. Therefore, in the teaching link, especially in the teaching content related to the key operation, on the basis of completing the theoretical knowledge teaching, arrange a certain time for computer operation

(5) Excellent course platform interaction method: considering the limited class hours, in the classroom teaching process, the frame structure of the flat roof is mainly used as an engineering case, while in practice, the frame structure, shear wall structure, frame shear wall structure and other forms of the sloping roof are widely used. Therefore, in order to enable students to get more knowledge, make full use of excellent course platform, make relevant videos and upload them to the platform for students to learn. At the same time, in the "problem discussion" module of the excellent course platform put forward some professional problems to discuss with students

6. Conclusion

The essence of engineering education professional certification is ability assessment, which runs through all personnel training links, especially curriculum teaching. According to the requirements of social demand, the ability requirements of structural design engineers are investigated. On this basis, the specific ability objectives of YJK structural software application course are determined, and the specific teaching content of the course is determined. According to the characteristics of each teaching content, the corresponding teaching methods are determined. Finally, according to the ability objectives and engineering education professional certification. The concept of continuous improvement determines the specific assessment method and the content of the course.

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