

Studies on Teaching Mode of the Construction Engineering Surveying Course Based on Work Process for Higher Vocational Education

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Abstract. Based on the working process of the systematic theory in higher vocational construction engineering surveying course development, to solve the binary separation of theory and practice problems in higher vocational education since the long-term. Through inducing typical work tasks in the process of working, realize the combination of the areas of action and learning areas, can cultivate the students' core professional ability, help the students obtain direct experience, to lay a good foundation for students' career growth.

Keywords: the construction engineering surveying, work process, teaching mode.

1. Introduction

Higher vocational education pays attention to ability education and professional education, has strong pertinence, its teaching goal is to train higher technology applied talents of production, construction, management, and service train higher technology applied talents. And to achieve this goal, one of the most important way is to implement based on the working process of the teaching reform^[1]. In recent years, with the continuous development of construction industry, engineering requirement for construction engineering surveying large changes have taken place, and not to adapt some of the flaws in the traditional teaching is also gradually appear, therefore, based on the working process of the construction engineering surveying it is necessary to explore the reform of practice teaching.

Construction engineering surveying is an important course in civil engineering education. Due to surveying throughout the course of construction, so the teaching quality and effect is directly related to students' professional ability to work after graduation. How to make students in the limited time, to master the principle and method of surveying to master the procedures and skills of construction engineering surveying, to train students to complete the comprehensive ability of surveying's task; to meet the requirements of building enterprise post ability, is the main goal of our current construction engineering surveying teaching.

But at present, most of the graduates in the construction site, in the face of the actual engineering tend to be at a loss, they don't know where to start, enter the job roles need a longer adjustment period. The reason for this is due to the problem on teaching content and teaching methods, Make the theory and the work is not a good docking between actual application skills.

At present, the teaching of construction engineering surveying mainly exist the following problems: According to the theory of theoretical knowledge as the main body in the course content, course is too concentrated, long time interval between theory and practice. Can't effectively foster students' ability. As the starting point for learning theory knowledge, course content according to the knowledge logical organization, ignore the knowledge with specific work. Practice teaching programs do not fit the actual job requirements. Current measuring instrument has been the development by leaps and bounds, the new measuring method has been widely used in the practical

work, and at present higher vocational engineering surveying practice teaching project from the work practice, training content too multifarious, old, cannot adapt to the requirements of actual work. The experimental training teaching method is single, not fully stimulate students' learning enthusiasm and interest. Experimental training performance evaluation is difficult to objectively and accurately assess student internship performance. At present the training of vocational construction engineering surveying course grade evaluation based primarily on the student's internship report and the student's performance in training, both together to assess. Due to the fellow students tend to have an internship report copying each other, and each student's performance in the internship is very difficult to master, therefore, not an objective evaluation of each team member's training result, will not be able to effectively stimulate students' learning enthusiasm.

Working process oriented on the vocational education in the design of deconstruction of traditional subject system, constructed in line with the professional ability to form regular vocational education mode. In view of this, based on the working process of the practice teaching of the curriculum reform is an effective way to solve the above problem.

2. The connotation of the working process and Curriculum development mode

2.1 The connotation of the working process.

Working process is to “professional” scientific analysis tool, is staff to complete a task in a work situation and work for a complete work the program of action. Work-integrated learning course is a systematic work process, which is also called” based on the working process”.

Based on the working process of the frame of reference, the declarative knowledge and procedural knowledge are integrated, practice knowledge and theory knowledge are integrated, moderation, and adequate amount of declarative knowledge did not change, but such knowledge in the course of sorting mode has changed. The course is no longer a static discipline system, instead dynamic action system is generated and build.

In current vocational education reform in our country, in order to improve students' vocational ability, stimulate students learning enthusiasm and meet the needs of enterprises to the talent quality request, using the German vocational education advanced concepts, combined with the actual situation of vocational and technical education in our country, put forward based on the working process of the curriculum development and teaching idea. It will become the direction of the current and future vocational education curriculum reform in our country, and can form the localization, the development of vocational education curriculum mode with Chinese characteristics, because it conforms to the law of vocational education, easy to stimulate student's interest, cultivate students' comprehensive vocational ability.

2.2 The advantages of teaching mode based on working process.

From the form, “teaching mode based on working process” is Teaching methods from the theoretical derivation to scene real teaching. The purpose is to through the stimulation of scenario, avoid the insufficient capacity of vocational students' theoretical derivation weaknesses, stimulates the student to study the efficiency. In essence, it is closer to the jobs need to build a new system of teaching. Although suspected of eager, it can effectively solve the specific object of the students' learning difficulties, to meet the demand of jobs as soon as possible.

(1) Refactoring curriculum system: Break the traditional subject curriculum system, in view of the actual work system to build a course system, and according to the actual work structure redesign curriculum structure.

(2) Reorganization of teaching content: Broke the traditional subject curriculum to discipline knowledge logic as the main line, the specialized theory knowledge as the main body of the teaching content, in accordance with the need of actual work tasks, occupational activities as the main line, to develop professional ability as the standard, reorganize the teaching content and design.

(3) Transformation of the mode of implementation: Break the course main subject knowledge, the students passively accept, the implement method of practice with theory, students take the initiative to build, the implement method of the integration of practice and theory.

(4) Reforming the teaching situation: Broke the single teaching mode, classroom teaching environment, work and create as much as possible close to the reality of teaching environment, school environment and working environment, campus culture and the organic integration of corporate culture.

2.3 Based on the working process model of curriculum development.

Course is the substantive elements of talent training activities and mode, is the carrier of education thought and target of personnel training. Course is "the teaching content system according to certain procedures", is the sum of the teaching contents and its process, the main means to achieve certain teaching goals and a set of orderly education activities of the organization [2].

Based on the working process of the course is to break the bondage of traditional disciplines systematization, the learning process, work process and the student's ability and personality development organic link, focus on cultivating the students' professional ability, professional ability, method ability and social ability).Based on the working process of the curriculum development and teaching post professional ability and combine the students' learning areas [3].

(1) Work area: it can be regarded as set of interrelated tasks in the professional operation situation, also can be regarded as people in work and daily life have to deal with all kinds of problems.

(2) Typical work tasks: it is a professional operation of the specific work areas, also known as professional areas of action, it is the working process of the complete structure of integrated tasks. It is Reflected the typical of the working content and working way of the career. Process of typical work task to promote the vocational ability development of practitioners, and to complete the task of most methods and results are open. Typical tasks from the corporate practice, is aimed at professional.

(3) Learning areas: Vocational education learning areas is based on professional typical tasks of teaching units. There is no one-to-one correspondence relationship between it and subject knowledge field, but from the concrete transformed "field", often characterized by the integration of theory and practice of comprehensive learning tasks. Through a study in the field of study, students can complete a career of a typical task (useful career areas of action description), with a kind of typical "problem situation"; according to a number of systematic study in the field of study, students can obtain professional qualification of a career. A basic feature of learning areas is: "has the working process of the whole learning process", namely the students thinking and learning in the comprehensive action, from a specific task, planning, implementation, inspection, evaluation and feedback throughout the process.

(4) Learning situations: it is a case study of the unit, it put the theoretical knowledge and practical application of practical skills environment together, "learning areas" is the embodiment of the macro program. Based on the working process of the curriculum development process are shown in figure 1.

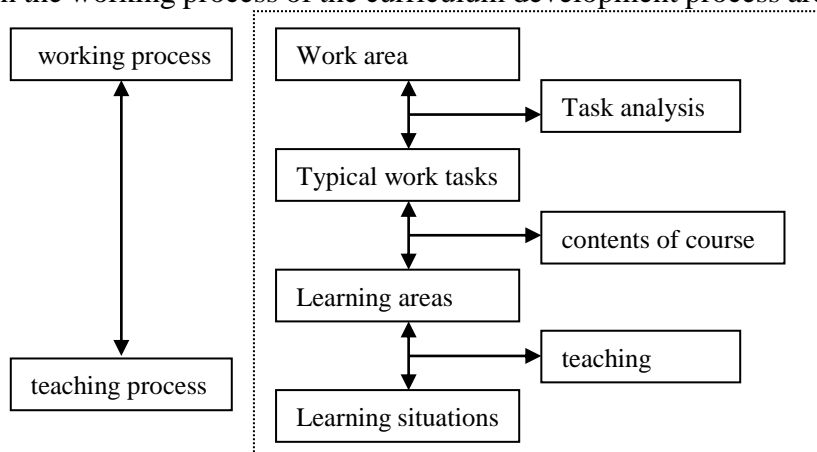


Figure1. Based on the working process of the curriculum development process

3. Develop the construction engineering surveying course Based on the working process

3.1 The typical work tasks of construction engineering surveying.

In order to sum up typical work tasks, the related construction unit to be investigated, keep track of the outstanding graduates, discuss with university-enterprise cooperation unit. In order to build construction engineering surveying course corresponding to the typical work tasks for the project construction preparation stage, construction stage and completion acceptance stage. The typical work tasks of construction engineering surveying are shown in table 1.

Table 1. The typical work tasks of construction engineering surveying

Project construction phase	The typical work tasks of construction engineering surveying
	Read the drawings
Construction preparation stage	Able to prepare and verify calibration measuring instrument Control survey of construction site Earthwork survey and earthwork calculation Positioning and layout
The construction phase	foundation construction survey main structure construction survey settlement observation
Acceptance Certificate phase	Completion figure of surveying and mapping

3.2 The Learning areas of construction engineering surveying.

Typical work tasks is to streamline working task, typical work tasks achieve the transformation of work tasks to study areas. Learning areas were summarized, shown in table 2.

Table 2. The Learning areas of construction engineering surveying

Project construction phase	The typical work tasks of construction engineering surveying	The Learning areas of construction engineering surveying
	Read the drawings	Read the construction drawing and related drawings
Construction preparation stage	Able to prepare and verify calibration surveying instrument Control survey of construction site Earthwork survey and earthwork calculation Positioning and layout	The method of surveying instrument calibration Control survey The method of earthwork surveying and calculation The method of Positioning and layout
The construction phase	foundation construction survey main structure construction survey settlement observation	The method of elevation layout, The method of axis location settlement observation and data filing
Acceptance Certificate phase	Completion figure of surveying and mapping	the large scale topographic surveying and mapping

3.3 The learning situations of construction engineering surveying.

After The Learning areas of construction engineering surveying are build, the tasks are decomposed and the ability are sorted again. We can develop the learning situation of construction engineering surveying course. It is shown in table 3.

Table 3. The Learning situations of construction engineering surveying

Project construction phase	The Learning areas of construction engineering surveying	The learning situations of construction engineering surveying
Construction preparation stage	Read the construction drawing and related drawings	The large scale topographic map knowledge chart and application
		Read the construction drawing and related drawings
	The method of surveying instrument calibration	Use level and correction
		Use theodolite and correction
		Use total station and correction
	Control survey	Angular surveying
		Distance surveying
		Height difference surveying
		one-rank traverse control survey
		3, 4 order leveling surveying
		The layout of architectural grid and architectural baseline
	The method of earthwork surveying and calculation	Earthwork surveying by total station
		Earthwork calculation by CASS software
The construction phase	The method of Positioning and layout	Coordinate method of laying out
		Method of rectangular coordinates angular intersection
		Axis control pile test set
	The method of elevation layout, The method of axis location	elevation layout and axis location of foundation engineering
		elevation layout and axis location of main structure construction
		Outside axis control method
		Internal axis control method
	settlement observation and data	second order leveling
Acceptance Certificate phase	the large scale topographic surveying and mapping	acceptance survey the large scale topographic surveying and mapping

4. Teaching methods and evaluation

4.1 Teaching methods.

The characteristics of the action-oriented teaching mode based on working process is: take the student as the center, teachers and students are interactive in the whole process of teaching, all students are participating in the whole teaching process, pay more attention to the cultivation of the students' ability. The aim of teaching is to promote the development of learners' professional ability, the core is to put the action process unifies with the process of learning, therefore teaching method

of action guiding type, students in the process of learning use not only the brain, but the brain, heart, hand in learning, through the behavior of the guide, so that the students in activities are to be improved, learning interest and cultivate creative thinking is to be trained. Surrounding the professional work content, traditional subject system of knowledge and curriculum content are converted into a number of learning situation, through the project organization and teaching, make students directly involved in the project process, cultivate the students' ability of solving practical problems, the ability of communication and cooperation with others, application technology, computing ability, the ability of self-improvement and development.(1)The teaching method of demonstration - mentoring-enlightening: The understanding and use of level, theodolite, total station can adopt the teaching method of demonstration - mentoring-enlightening.(2)The teaching method of MPDCE(mission-plan-done-check-evaluate): Mission- let the students get information such as the tasks and solve the problem of situation; Plan -students prepare task goals, choose work plan; Done-Students implement the work according to the established plan; Check-contrasting task and plan, students take self-inspection, mutual inspection and special inspection (teachers) in a way to check the task fulfillment, and adjust the task according to the results of the inspection. Evaluate-the teachers evaluate the task fulfillment according to task completion. (3) Stimulant situation: In the approximate real situation, so that the student complete a simulation task under the guidance of teachers. The concrete is: Starting from the actual work process, create the actual working situation and proposes the question to the students; to guide students according to the master of professional knowledge to analyze problems, identify practical solutions; each student of training team began to do according the division of tasks, but teachers should positive guide, demonstrate and analysis student's practical problems appeared in the process in time.

4.2 Evaluation.

Comprehensive ability training mainly adopts the task driven teaching mode, in the process of the implementation of the task driven teaching method, the evaluation is a very important link, the evaluation can give enlightenment from several aspects, let they found that the advantages of the companion, see my own shortcomings, to the original rational knowledge skills and operational knowledge for effective integration, form the comprehensive ability of the knowledge, teachers should pay attention to the following points in the evaluation ^[4].

Pay attention to the evaluation of learning process of students.

The comprehensive evaluation of the result of the task, guide students to reflect on.

Pay attention to the students in completing the task of knowledge skills quality evaluation, is not only on the value of knowledge and skills of cooperation attitude, creative problem put forward to evaluate such as equally important.

The self-evaluation, group members evaluation, teacher evaluation and diversified evaluation methods, to student's learning behavior to give scientific and fair evaluation.

5. Conclusion

The curriculum development model based on the working process can solve the course content and practice content of docking in a certain extent, butt joint training projects and work tasks, to achieve production unit "to do", "learn what", "learn what" "teach what"^[5-6]. Transformed the traditional teaching methods, the classroom is namely return to the students. According to the different course content to take different teaching methods, practice teaching purpose is to realize the situation and working situation of docking, so that the students in their own "hands-on" practice, consolidate the professional knowledge, master professional skills, develop social skills and the ability to approach, to build their own experience, knowledge or ability system. Perfect the way of teaching evaluation, through the establishment of the objective, reasonable training performance evaluation system, stimulate the students' interest in learning; At the same time when choosing a talented person to provide reliable basis for unit of choose and employ persons, unit of choose and employ persons can take advantage of the evaluation system of professional ability of the correct understanding of jobs for

graduates, to scientifically choose suitable for the people of this unit; Students also can according to the correct understanding of their own professional ability evaluation system, choose suitable for their jobs.

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