

Research and Practice on Teaching Reform of Engineering Measurement Course Based on Project Driven

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Abstract: With the continuous progress of new technology of surveying and mapping and the continuous innovation of measuring instruments, the traditional practical teaching of engineering surveying course can no longer meet the requirements of modern engineering for personnel training. Engineering survey is the main guiding technology of engineering construction and the foundation for civil engineering technicians to engage in engineering construction. Project instructional method refers to a series of processes that teachers assign problems and tasks to students in the form of projects, and students collect information, make plans, make decisions, and implement plans in the form of individuals or groups. This instructional method comprehensively cultivates students' listening, watching, doing, thinking and practicing. Project driven teaching is a new instructional method based on the combination of practice and theory. By analyzing the current situation and main problems of practical teaching of engineering survey course, combined with the discipline characteristics of engineering survey course, starting from highlighting the cultivation of students' innovative ability and the requirements of "zero distance" employment, this paper discusses the reform of practical instructional mode, instructional content, instructional methods, instruments and equipment and practice site of engineering survey course. Curriculum teaching reform is the focus of curriculum construction and the key to improve teaching quality.

1. Introduction

Engineering survey is a subject with strong applicability and practicality, and many engineering majors in colleges and universities offer this course. Its main contents include basic survey work, topographic survey and construction survey, and the teaching links include theoretical teaching, inter-class experiment and concentrated practice. It plays an extremely important role in cultivating students' basic skills and practical ability in mapping, reading, using and lofting, as well as the ability to analyze and solve problems [1]. After nearly two years of construction, we have established and improved a relatively systematic and scientific management system, sorted out a relatively complete set of curriculum construction materials, added teaching equipment with complete categories and advanced equipment, established a teaching team with reasonable structure and high quality, and formed a complete practical teaching system. We have made beneficial exploration and practice in the combination of industry, University and research, and achieved a number of relevant teaching and scientific research achievements. With the rapid development of modern surveying and mapping technology represented by 3S and the continuous application of new technologies and instruments in engineering construction, the traditional engineering survey practice teaching is far from meeting the practical needs. In order to meet the requirements of students' zero distance employment and better cultivate students' practical innovation ability, it is necessary to reform the mode and content of engineering survey practice teaching [2].

Compared with the traditional instructional method, the project instructional method has different requirements for teachers, large demand for equipment and venues and certain requirements for teaching materials. The teaching goal of engineering surveying is to require students to master basic surveying theory knowledge and basic operating skills of measuring instruments, and be able to independently complete the construction surveying of buildings, so as to meet the quality and requirements of intermediate surveying and setting-off workers [3]. Due to the lack of theoretical knowledge and unskilled basic operation of measuring instruments, students can't

complete the task, or some students don't know the purpose of completing the task although they finish it on time. In some professional courses, the project instructional method has played a good role, such as the course of engineering survey. Engineering survey course belongs to the survey specialty in higher vocational colleges, and its practicality is relatively strong. It is urgent to re-understand and reform the teaching of engineering survey to meet the needs of production. Only by continuously deepening the teaching reform can we comprehensively improve the teaching quality, promote the improvement of curriculum construction level, and cultivate high-quality talents, so as to better meet the needs of society for talents under the new situation [4].

2. Project-driven teaching

2.1. The connotation of project-driven teaching

"Project-driven teaching" refers to a complete and specific project arranged by teachers. Teaching activities that allow students to complete all tasks to be completed in this project independently or jointly by teachers and students under the guidance of teachers. In teaching, teachers give tasks or problems to students in the form of projects. Students make plans according to practical work, complete assigned projects, and gain theoretical knowledge and operational skills. In this process, the teacher plays a guiding role, and students can do it by themselves or in groups. It is a kind of "project introduction, task-driven" as the main form, which runs the production practice project through the whole teaching process, introduces new knowledge with projects and tasks, and stimulates students' learning motivation; When imparting knowledge, it is closely combined with engineering practice projects, so that students can learn something useful; Students design, manage, develop and make the project by themselves, so as to apply what they have learned, consolidate the theoretical knowledge they have learned in practice, and achieve mastery through a comprehensive study, so that students can have a successful experience [5]. In the teaching project, teachers take each task in the project as the main line, integrate the relevant knowledge points into each link, and promote the project layer by layer. The general process of project driven teaching is shown in Figure 1.

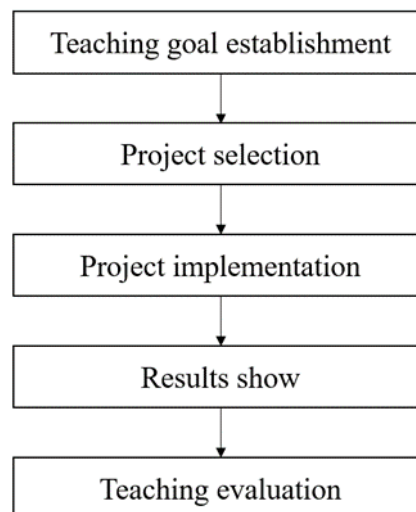


Figure 1 Project-driven teaching flow chart

2.2. Design principle of project-driven instructional method

In order to achieve good teaching effect, a good project driven teaching task should have the following conditions: the project must be a real application project with clear task description; The technical knowledge used in the project must be closely related to the instructional content, which can deepen students' understanding and mastery of theoretical knowledge; The design and implementation of the project must be difficult to drive students' interest in thinking and solving existing problems; In the whole process of project driven teaching, we should pay attention to

cultivating students' team spirit, as well as their mastery and flexible application of knowledge and technology, so as to mobilize students' enthusiasm for participation. The project instructional method has three characteristics: in the process of teaching, the core is students, and students should study independently and explore; Students should actively participate in the whole teaching process, such as information collection, scheme formulation, decision-making, scheme implementation, etc. in this way, it is conducive to the improvement of students' comprehensive ability; In the process of teaching, teachers play three roles: harmonizer, consultant and organizer. When implementing the project instructional method, three teaching conditions should be met. First, teachers should have high quality. Teachers should make full preparation before class before implementing the project instructional method. Second, the teaching materials used meet the requirements of the project teaching. The measurement knowledge involved runs through it. Third, teaching equipment and training venues should be sufficient. When implementing the project instructional method, there are high requirements for equipment and sites, and each project needs six to eight sets of equipment [6].

2.3. Design and implementation of project-driven instruction

Before the implementation of project driven instructional method, students must ensure that they have completed the knowledge accumulation of theory courses. The success or failure of curriculum reform by using "project introduction and task driving" in engineering survey teaching lies in the determination of teaching projects and tasks. Teachers must fully understand the actual information about engineering survey in the current actual project, combined with the school's own hardware facilities, and establish the task and effect of the project under the condition of fully meeting the needs. The quality, difficulty and ease of the project and whether the learned knowledge can be highlighted are the key to whether the project driven teaching can meet the teaching requirements [7]. The instructional content of engineering survey course is designed into three teaching items: elevation control survey, plane control survey and building construction survey. Always adhere to the principle of making tasks from simple to complex and step by step from the perspective of students, and decompose each teaching project into several specific tasks. The whole process adopts the project-driven instructional method based on group cooperation. Project-driven instructional method based on group cooperation refers to a new instructional method in which students help and promote each other, cooperate, explore and discuss with each other in the form of learning groups on the basis of equality and voluntariness, and jointly complete learning tasks. This instructional method absorbs the advantages of cooperative inquiry and task-driven: from the perspective of students, it especially emphasizes that group members have the same goal in thought, active attitude, cooperation in action and common improvement in results; From the teacher's point of view, it requires teachers to design suitable learning projects, strengthen the guidance of learning strategies, transform and solve learning problems in time, and correctly detect and evaluate learning effects [8].

3. Application of project driven Teaching in engineering survey

In the teaching of engineering survey, teachers abandoned the traditional instructional methods: blindly instilling theoretical knowledge and operation skills. Carry forward the project instructional method, which is conducive to the cultivation of students' listening, watching, doing, thinking and practicing. It can not only skillfully operate the instruments, but also enable students to effectively deal with practical problems. Due to the adjustment of professional plan and professional structure, the class hours of engineering survey theory have been reduced compared with the past, but the proportion between each link remains basically unchanged. After years of teaching research and practice, the engineering survey curriculum system has been formed, and gradually tends to be reasonable with the deepening of professional teaching reform. Due to the continuous emergence of new surveying and mapping instruments and technologies and their wide application in surveying and mapping engineering, fundamental changes have taken place in surveying and mapping from theory to practice [9]. Therefore, the instructional content of engineering survey course must be guided by the traditional surveying and mapping theory, with modern surveying and mapping technology as the means, with the purpose of meeting the needs of engineering survey, revise the

teaching syllabus and the syllabus of experiment and practice in time, and select and compile engineering survey teaching materials and experiment and practice instructions suitable for modern needs. Engineering measurement course is a discipline with a strong separation between theory and theory. Students should have the ability to analyze and deal with problems as well as theoretical knowledge, so that they can independently engage in projects in this industry. In order to achieve this goal, in the teaching process, the teacher adopted the project instructional method.

By learning basic operation knowledge, it can be flexibly applied to specific practice. Reasonably adjust the structure of course content. The current syllabus fundamentally changes the past model of emphasizing foundation, theory and practice, appropriately reduces the requirements of basic theory, improves the requirements of the application of basic surveying and mapping theories and methods in engineering, appropriately simplifies some contents, and timely adjusts them according to the increase or decrease of teaching hours. In terms of the overall content, there is no need to overemphasize the systematicness and integrity of the course. If only the basic concepts, basic principles and basic methods of engineering surveying are described without combining the corresponding specifications and engineering examples, students will only have theoretical knowledge and lack the ability to apply engineering surveying knowledge in practical engineering, resulting in the disconnection between theoretical knowledge and the requirements of engineering practice. The outline content should be updated in time. Out-of-date methods and means should be deleted from the syllabus without hesitation, while new instruments, new technologies and new methods should be supplemented in time, and reasonable requirements should be put forward so as to implement them reasonably in teaching. Do theory to guide practice, and verify practice. In the process of measurement, students should be able to combine the three basic tasks of measurement into project engineering, so that students can decompose complex projects into simple basic tasks of measurement, measure and then sort them out. Let students understand that the essence of plane coordinate control network measurement is measuring horizontal angle, measuring horizontal distance and calculating and sorting out the results.

Classroom teaching should be few but precise, highlight the key points, difficulties and doubts, make full use of wall charts, wall watches, models, physical objects and other teaching means to simplify the complex content, popularize the difficult content and concretize the abstract content, select appropriate chapters to organize students to study by themselves, talk about ideas first, then let students study by themselves, and put forward problems in combination with professional practice, Carry out classroom discussion, guide students' thinking and activate the classroom atmosphere. The use of heuristic teaching has fundamentally changed the situation that students are listened to and spoken, and cultivated students' self-study ability, problem analysis and problem-solving ability [10]. In order to achieve the expected results, a relatively stable experimental practice base has been established, and various rules and regulations for instrument management have been formulated. Teachers strictly abide by the experimental and practice guidance system, and carefully organize and reasonably arrange experiments and practice according to the requirements of the experimental syllabus and practice syllabus. As a link in teaching, the purpose of learning evaluation is to let students know the current situation of their learning, so as to correct and encourage them. After the task assigned by the teacher is completed, each group should evaluate the results, say their own understanding, and then the teacher will check and evaluate the whole process and results made by the students. In this way, it will help to improve students' learning efficiency and strengthen their learning consciousness and control ability.

4. Conclusions

With the continuous development of new surveying and mapping technology, teachers need to think deeply about the teaching reform of engineering surveying, comply with the requirements of the times, and adjust the instructional content and teaching plan in time. Through the in-depth teaching reform of engineering surveying course, the quality of surveying teaching is fundamentally improved and the comprehensive development of course construction is promoted. Project driven teaching is a instructional method to implement the exploratory instructional mode. From the

perspective of students, project driven teaching is a learning method. It is suitable for learning all kinds of practical and operational courses, and can help students clarify their learning objectives. From the teacher's point of view, project-driven teaching is an instructional method based on the theory of component-based, which is conducive to cultivating students' autonomous learning, analyzing and solving problems. This paper studies the project-driven teaching and introduces the application of project-driven teaching in engineering surveying. The introduction of project-driven instructional method in engineering surveying practice teaching can closely connect with the actual needs, so that students can truly experience the usefulness of learning, which will greatly mobilize students' learning enthusiasm and initiative, and cultivate students' ability to solve practical problems and teamwork.

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