

The Application of Project Teaching Method in the Course of "Fundamentals of Electronic Technology"

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ABSTRACT

In order to improve the ability of students from vocational and technical education of non-commissioned officers to analyze and solve problems, and to enable students to adapt to the posts, the project teaching method is effective. The project teaching method is applied to the course of "Fundamentals of Electronic Technology", including five links, such as topic leading -in and clarification of tasks, independent collaboration and specific implementation, expansion and guidance and process inspection, display of results and correction and improvement, evaluation and testing and sublimation. With the use of project teaching method, the creative potential of the students is tapped, and the students' enthusiasm for actively learning the course of "Fundamentals of Electronic Technology" is greatly stimulated. Therefore, it is a new way to realize the educational idea of "taking students as the center", which enables students to truly master "Foundation of Electronic technology", and promotes the all-round development of students from vocational and technical education students of non-commissioned officers, and has achieved good teaching effects.

Keywords: *Project teaching method, Teaching design, Learning objectives, Active learning.*

1. INTRODUCTION

The course "Fundamentals of Electronic Technology" is a compulsory professional basic course for junior college students majoring in information communication. The teaching contents mainly include four modules: fundamentals of circuit, fundamentals of analogue circuit, fundamentals of digital circuit and principles of digital communication, which will lay a solid foundation for the study of information communication courses. However, this course is abstract and boring, but strong in practicality. At present, the contents have been integrated and optimized according to the features of the curriculum and majors and the characteristics and job demands of students from vocational and technical education of non-commissioned officers, but there are still many problems,[3] such as low learning interest and lacking active learning enthusiasm. The earliest prototype of project teaching method was part-time job for study in Europe in the 18th century and cooperative education in the United States in the 19th century,

which was prevalent in Germany. This method originated from the idea of labor education in Europe, and gradually became perfect in the middle and late 20th century, becoming an important teaching mode, especially suitable for vocational and technical education. Project teaching method is a teaching method that human beings carry out practical teaching activities by completing a complete "project" work.[1] This teaching mode enables teachers to obtain the feedback information of students and adjust the following classroom teaching activities in time. The project teaching method is applied to the teaching of "Fundamentals of Electronic Technology", including five links, such as topic leading-in and clarification of tasks, independent collaboration and specific implementation, expansion and guidance and process inspection, display of results and correction and improvement, evaluation and testing and sublimation, achieving a certain teaching effect.

2. THE EXISTING TEACHING MODE OF ELECTRONIC TECHNOLOGY COURSE

The existing teaching mode of information communication specialty of vocational and technical education of non-commissioned officers is mainly the training mode of integrating theory and practice. With the continuous deepening of teaching reform, good results have been achieved, but new requirements and challenges have been put forward for information communication posts under the new situation, and the training mode at the basic ability stage of information communication specialty still has many deficiencies, for example, the professional basic ability cannot well match the post needs of the army. Through the investigation of relevant professional departments and the army, this paper studies the training contents of the professional basic ability of the students of information communication specialty of vocational and technical education of non-commissioned officers, and integrates and optimizes the professional basic knowledge required by the information communication specialty of vocational and technical education of non-commissioned officers, such as fundamentals of circuit, fundamentals of analogue circuit, fundamentals of digital circuit and principles of digital communication. At the same time, it is necessary to investigate the training contents of professional basic ability of students from the information communication specialty of vocational and technical education of non-commissioned officers, and increase the relevant teaching contents of practical skills according to the needs, such as basic electrical knowledge, digital communication principle, sensor, SCM application, etc. The group training method is oriented towards the actual work problems of the army, and changes from plan guidance to demand-based planning. However, there are still some problems, such as being not closely related to the actual needs of the army, insufficient learning motivation or low learning interest. In order to solve this problem, the project teaching method is adopted, and typical military cases are taken as the topic leading-in, so as to better stimulate students' interest in learning. With the use of project teaching method, the students are required to complete the assigned work tasks, and students' cooperation ability, communication ability and practical problem-solving ability will be cultivated and exercised through specific tasks, which is conducive to improve the students' comprehensive ability to analyze and solve the

problems of electronic technology, and is also conducive to the students' all-round development.[2]

3. THE SPECIFIC IMPLEMENTATION PLAN OF THE PROJECT TEACHING METHOD IN THE COURSE OF "FUNDAMENTALS OF ELECTRONIC TECHNOLOGY"

The project teaching method includes five links, such as topic leading-in and clarification of tasks, independent collaboration and specific implementation, expansion and guidance and process inspection, display of results and correction and improvement, evaluation and testing and sublimation.

Taking the differential amplification circuit as an example, the specific teaching implementation design of project teaching method is introduced.

3.1 Topic Leading-in and Clarification of Tasks

"Interest is the best teacher". If teachers can effectively stimulate the students' interest in the teaching process, the students' initiative to explore and seek knowledge will be greatly mobilized. Therefore, teachers should grasp the points of students' interest in the leading-in link and effectively stimulate their desire for knowledge, while students of vocational and technical education of non-commissioned officers are generally interested in knowledge related to information war. Teachers can upload teaching materials through online teaching platforms such as Rain Classroom and Tencent Class before class. In the leading-in link, contents such as weapons and equipment in the modern information war can be added. Through the typical military case of laser simulation engagement system, much problems will be brought by the relatively poor conditions. With the use of methods of conceiving questions, teachers can lead in new lesson, and the theme of the class and students' daily military training will be connected, attracting the attention of the students and stimulating students' interest. Leading-in is the basis for teachers to organize classroom teaching contents and classroom teaching design, is the standard to evaluate students' learning effect, and is also the most important link in project teaching method. In the project teaching method, it is required to put emphasis on the specific teaching task, the learning contents, learning methods, and

the purpose. Project teaching method refers to the fact that people can learn by doing. In the case of teaching design, the integration of the theory and practice must be fully reflected. Each case covers a wide range of knowledge points and skills, but it is required to be in accordance with the requirements of the teaching syllabus to highlight one or several ability requirements when designing the cases, that is, the teaching objectives should be reflected in the designed cases, and the goal setting should be in line with the actual situation and job requirements of the students from information communication specialty of vocational and technical education of non-commissioned officers, so as to facilitate the students to be competent for the job requirements quickly in the future, and more in line with the training objectives of application-oriented talents.

3.2 Independent Collaboration and Specific Implementation

In the basic courses of electronic technology, appropriate and feasible teaching objectives should be set according to the characteristics and actual conditions of students in the vocational and technical education of non-commissioned officers. Specific objectives are set according to the teaching contents, so as to create an atmosphere of conceiving problems and stimulate students' awareness of inquiry.[6] Problem is a golden key to open the door of wisdom. According to the specific tasks, it is required to set specific problems in accordance with students' cognition, which can greatly stimulate the students' interest in learning and seeking knowledge. As the organizer and leader of classrooms and teaching, teachers must be good at mining internal potential, encourage students to use their own way of thinking to think and explore, and encourage students to participate in case design or design cases independently.[1] In this link, students can design circuits independently, as long as they meet the requirements of indicators. In this way, students' learning interest and initiative to participate can be improved, and students can be the real master of electronic technology. For students of vocational and technical education of non-commissioned officers, it is required to put emphasis on the practice and pay less attention to the computing. For the study on differential amplification circuit, the focus should be on working principle of the differential amplifier circuit. By analyzing the experimental data, students can concentrate on the difference module and common mode of the differential amplification circuit, and use knowledge to solve practical

problems. The differential amplifier circuit is designed to solve the problems encountered in laser simulation engagement system in dirty environment. According to actual needs, the parameters and requirements are set. Students make the exploration independently. Through the program demonstration, program design, experimental demonstration, program improvement and other links, students can further understand the principle of differential amplifier circuit and its application. This kind of independent cooperation teaching mode that enables students to participate in it can stimulate students' enthusiasm and motivation for learning, and also make it easier for students to understand and accept knowledge points learned. Meanwhile, it also cultivates students' ability to explore, analyze and solve problems independently.

3.3 Expansion and Guidance and Process Inspection

Teachers can distribute pre-test of differential amplification circuit through Yuketang platform, understand students' mastery of relevant knowledge, and better understand the situation of mastery of teaching contents. With the use of existing knowledge and experience of students, the knowledge framework can be built. Through testing, students clearly understand the teaching content and key points. The pre-test enables teachers to do something with a purpose, and to set teaching starting point according to the actual situation of the students. In this way, students can start from the actual situation, so that students can study with great interest, and teachers' appropriate and feasible guidance is more in line with the law of cognitive development of students, so as to better improve the efficiency of classroom teaching.

3.4 Display of Results and Correction and Improvement

Teachers would set a link of display of results and show students the design thinking, design thoughts, design scheme and tasks. Groups can display the design results through competition display, performance display, debate display, research display and other flexible display. Teachers organize groups to make evaluation on each other, summarize the innovative points and advantages and disadvantages of design schemes, and summarize the problems and deficiencies in the process of independent collaboration. Teachers listen carefully, keenly capture the problems in students' reports, and arouse students' attention and

thinking through the form of questioning. Teachers should praise the advanced, encourage the backward, and give guidance to improve the designing scheme, at the same time, and leave the appropriate time to students to improve the design plan. After students revise the design plan, teachers should make the comments and summary, and encourage students to make the improvement and seek the excellence constantly. By means of grouping, collective communication, achievement display and sharing, students can not only gain the development of knowledge and ideas, but also enjoy their body and mind, cultivate their emotions, share the joy of success, and improve their enthusiasm and interest in learning.

3.5 Evaluation and Testing and Sublimation

Through group discussion, project task arrangement, after-class test questions issued by Rain Classroom platform and Tencent class, teachers can understand the actual learning effect of students, and check whether the teaching objectives can be achieved, and further arrange the teaching content and specific implementation plan according to the actual situation of the post-test.[5] In the link of classroom summary, students can form a clear main line for the key and difficult points of teaching contents through group summary, student feedback, and teacher's summary and sorting of the teaching contents, and further consolidate their grasp of the key and difficult points. For example, the key of differential amplification circuit is to summarize the difference module and common model of differential amplification circuit. With the use of PPT dynamic display, it is required to put emphasis on how to use the differential amplifier circuit to solve the impact of simulated engagement system due to the bad environment.

4. CONCLUSION

The application of project teaching method in the course "Fundamentals of Electronic Technology" is in line with the pyramid of students' cognition. Leading-in and learning objectives will stimulate students' interest in learning; pre-test can help teachers better grasp the actual learning situation of students;[4] participatory learning enables students to be the real masters of the classroom; post-test helps teachers to guide and arrange review content more clearly after class; assessment and testing provide students with a clear line on the key and difficult points of teaching. The

results of practical teaching evaluation show that the application of project teaching method in the course "Fundamentals of Electronic Technology" can improve students' self-efficacy, change passive learning into active learning, and improve the timeliness of students' learning of electronic technology course.

AUTHORS' CONTRIBUTIONS

Li Wen conducted a demonstration of the overall idea of the paper, Kouquan Zheng analysed data, Bo Zhang wrote the manuscript, Lihua Qi and Wenbin Zheng contributed to revising and editing.

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