A Preliminary Study on the Practice of Project Teaching Method in Military Vocational Education-a Case Study on the Electrical Professional Course of Special Vehicle Repairman Training

Najia Mao[1, a,*], Weike Zhou[2, b], Lijian Zhang[3, c]

[1] No. 80, Ningshuang Road, Yuhuatai District, Nanjing City, Jiangsu Province, 210012

[2] No. 80, Ningshuang Road, Yuhuatai District, Nanjing City, Jiangsu Province, 210012

[3] No. 80, Ningshuang Road, Yuhuatai District, Nanjing City, Jiangsu Province, 210012

[a] mao077@sina.com,[b] zweek@sohu.com,[c] 13396506@qq.com

*corresponding author

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Abstract: The project teaching method is the teaching method of "learning by doing and teaching by doing", which emphasizes the subjective initiative of students in teaching and is suitable for the combination of military vocational education and learning. Combined with the teaching practice of electrical specialty in the training of special vehicle repairmen, this paper conducts a research on how to carry out the reform of military vocational education under the guidance of "project teaching method" from the following three aspects: the advantages of project teaching method, the implementation process as well as viable solutions to the potential problems.

In November 2013, the Communist Party of China made it clear at the third plenary session of the 18th CPC Central Committee that it is necessary to deepen the reform of military academies and enact a new type of military personnel training system with the trinity of military academy education, military training practice and military vocational education. This is the first time that military vocational education has been placed in the same important position as military academy education and military training practice, which fully reflects the determination to attach importance to training and the necessity of improving the professional abilities of officers and soldiers. As the main position for the training of non-commissioned officers in modern mechanized units, training institutions for special vehicle repairmen undertake the tasks, including professional trainings for recruits, upgrading training from primary repairmen to intermediate repairmen, and professional skills appraisal training for soldiers. The education approaches in the training system should be valued with greater importance, which is a direct response to the call of the Party and the promotion of the innovative development of military vocational education in an all-round way. [1]Project teaching method is a kind of teaching method of "learning by doing and teaching by doing", which is widely used in the current vocational education. The method puts an emphasis on the subjective initiative of students in teaching and is suitable for the combination of military vocational education and learning. With an active exploration of the application of "project teaching method" in professional course teaching, this method contributes to improving students' ability of analyzing and solving problems, which is of great significance to enhance the teaching effect and training quality of special vehicle maintenance personnel training tasks.

1.Introduction to the "project teaching method"

The action-oriented professional teaching method-project teaching method is a student-oriented activity teaching method jointly created by Dr. Katz, a famous American child educator and professor of the University of Illinois, and Dr. Chad, a Canadian child educator and professor of Albert University, which is a very popular teaching method in the field of international education. The method is based on a division of the whole learning process into specific projects or events, with designs targeted on the teaching plans for each project. The methodology aims to achieve

various teaching objectives rather than a mere transfer of the ready-made knowledge and skills mastered by teachers to student. In other words, students under this teaching methodology are advised to complete the teaching tasks with the guidance from the teacher, instead of learning passively under the arrangement and instructions from the teacher. Moreover, students are further advised to conduct self-evaluation in order to achieve optimized teaching effects. The class is thus improved from the original result-oriented courses with focus on the learning process, dedicated to enhancing a variety of abilities of the students [2].

2. The advantages of using "project teaching method"

2.1 A stimulation to the learning interest of the students.

According to the theories of Educational psychology, curiosity is the major factor in enhancing the ability of applying knowledge as well as the impetus of a simple and efficient thinking method, which originally starts from pure interests for knowledge. To be specific, the thirst for knowledge derives from the interests. The conventional theoretical courses in electrical major generally adopt the traditional means of education, which are mainly based on the output of the teachers. In a conventional language class, the interactions between the organizer and students are mostly controlled questions asked by the teacher. In the whole teaching process, the lecturing of the teacher accounts for about 90% of the class time, while the remaining 10% is allocated to the students themselves for class activity. The whole teaching process is carried out around teachers, who would stand in front of the podium to complete their own teaching tasks. This teacher-centered teaching method objectively limits the full play of students' potential, resulting in relatively few interactions within the class. On the other hand, in classes under project teaching method, the lecturing of the teachers is strictly arranged less than 50% of the teaching content, which would allow ample time for class activities. Students are hence encouraged to thinking actively, conducting teaching tasks and completing projects independently. Moreover, the teaching approaches are intrinsically connected with the teaching methodology, providing motivations for the students. The positive feedbacks that the students get from the entire problem-solving process contribute to the incentive of studying. The encouragements from these positive feedbacks are beyond words, leading to the increase of subjectivity of the students. Therefore, students would have desires to seek knowledge and make extra efforts in studying, regarding learning as an easy and enjoyable activity[3].

2.2 Improving the practical operation ability of the trainees.

The purpose of electrical professional training for special vehicle repairmen is to cultivate applied talents with comprehensive knowledge of the field, who are qualified for error checking and maintaining, capable of solving potential problems. However, the current teaching materials are mainly based on circuit composition and working principle, and there are only a few circuit fault analysis and troubleshooting methods. With the limited teaching resources including the teaching equipments and other hardware, students can only learn some fixed troubleshooting methods in practical operation. After finishing the courses, problems would occur when students encountering the complex technical difficulty in their daily routines, most of which are random technical failures unspecified in their trainings. The project teaching method helps to improve the connection between the courses and the studying pursuits of the student. Under the teaching method, case studies regarding the potential difficulty of the technical projects are included in the teaching content, gradually enhancing the proficiency of the students in the circuit connection of the electrical equipment of special vehicles in the process of completing the project. Potential faults of electrical equipment would be analyzed inside the class, with illustrations over the feasible solutions and methods used to solve them. Students receiving the curriculum would have a better comprehension in the pragmatic operational approaches and constantly gain experiences in solving the problems that might occur [4].

2.3 Improving the evaluation system for trainees.

Although the “tripartite” joint examination of military training institutions can basically examine the students' mastery of theoretical knowledge and practical skills, it has the malpractice of "taking an exam for life", which makes the trainees ignore the actual goal of training. Students in this test system may blindly pursue high scores in the examination, and are likely to develop a negative working ethic during the daily routines. To implement the project teaching method, the evaluation results of each project can be included in the overall evaluation form of the students, or directly account for 30% of the final grade. Knowledge points of one or multiple chapters are included in each project, combined with the methodology of the project teaching method throughout the entire learning process. The method would present a comprehensive reflection of students’ learning attitudes in daily studying, demonstrating the work ethics of the students as well as the value of unity and mutual assistance. Adding the evaluation results of the project teaching method to the students' evaluation system will certainly play a positive role in the comprehensive evaluation of the students, promoting the students' initiative in their daily study with emphasis on the cultivation of ability and quality. Therefore, the evaluation system improves the overall effect of the vocational education[5].

3. Implementation of project teaching method

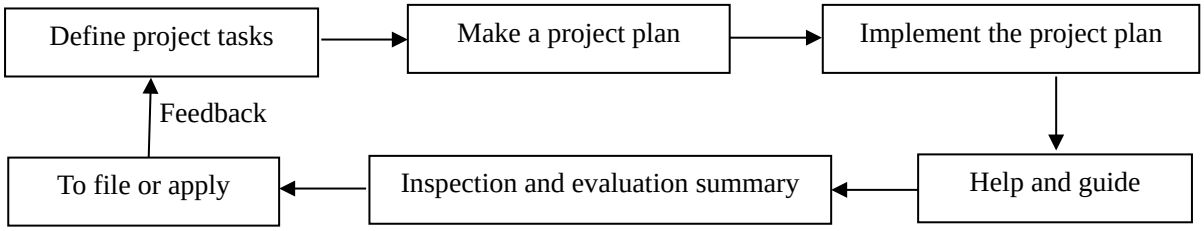

Figure 1. The flow chart of the implementation of the teacher's project teaching method

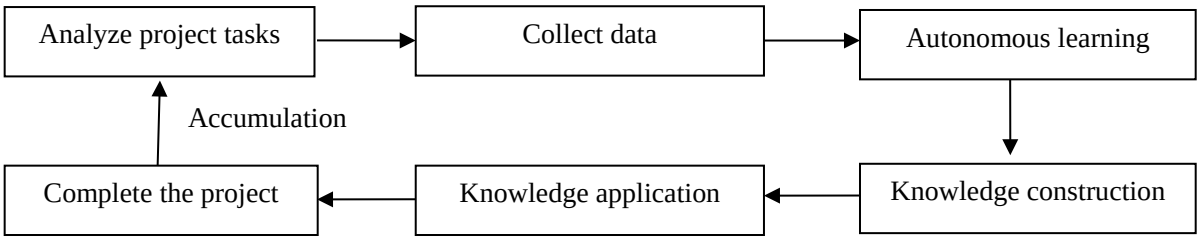

Figure 2. Flow chart of implementation of project teaching method for students

3.1 The methodology of the designed projects.

The establishment of the project is not a simple and easy task. Before the implementation of project teaching, teachers should make careful preparations before the class. By analyzing the teaching aims of each project task, teachers are advised to collect the relevant professional knowledge through academic resources. The design of the project needs to take into account the following aspects:

3.1.1 The practicability of the project.

After the training of the department, the cadets returned to the original army to directly engage in the repair of special vehicles. The designed project is not only closely linked to the syllabus and teaching objectives, but also takes into account the potential problems in the actual working scenarios actual of students. Students can thus apply what they have learned in their future work.

3.1.2 The level and difficulty of the projec

t.

The project is based on a thorough consideration the existing knowledge base, cognitive ability and interests of the students. From the student's point of view, different levels of tasks should be

designed for different levels of students. Most of the trainees who come to the department for training have only high school qualifications, and the difficulty of the project should be designed accordingly. It is necessary to let the trainees have the ability and confidence to complete the project, so as to arouse the learning enthusiasm of the trainees.

3.1.3 Enhancing the critical thinking abilities of the students.

The teaching plan should be designed with the training over the thinking abilities of the students. A comprehensive teaching methodology would discourage the students from thinking independently and conducting the projects by themselves. Only in this way can the curriculum inspire the students to try, explore and discover in person, and encourage them to follow the example and make progress. The method aims to cultivate the innovative and practical ability of the students [6].

For example, the project of "circuit wiring and fault analysis" can be included as a case study. The project presents a full coverage of all the knowledge points of the chapter regarding the starter motor, as well as the practical operation approaches and a relatively comprehensible circuit diagram. There are many problems worth thinking about and analysis from the students. The project is closely related to various specialties of the chassis, which is a frequent problem encountered by students engaged in electrical repairmen in the future, not to mention its value for analyzing and researching.

3.2 Formulation of project teaching plan.

The project teaching plan specifies the teaching methodology, including the definition of the teaching objectives of the project, the description of the project content, the allocation of class hours, the grouping of personnel, the teaching location and so on.

Take the teaching plan of “circuit wiring and fault analysis" project for an example:

Teaching objectives: the class is dedicated to improving the proficiency with the whole working circuit of the starter motor. Students can independently analyze the faults that may occur in the starting circuit. The project cooperation teaching method is applied to cultivate students' sense of teamwork.

Project description: students are instructed to complete the circuit connection between starter motor, starting button, starting control box, storage battery and circuit master switch; Students would briefly describe its working principle, causes of various faults, fault phenomena and problem-solving methods. Each group of students take turns to make a summary at the end of the class.

Allocation of class hours: a total of 28 class hours composes of a lecturing of the teacher (6 class hours), project preparation (4 class hours), project implementation (14 class hours) and project summary (4 class hours).

Personnel grouping: the whole class is equally divided into 3 groups according to the ability and quality of the students, with 6 students in each group.

Teaching location: electrical major model car workshop of a certain type[7].

3.3 Implementation of the project plan.

First of all, the teacher should make an elaboration of the knowledge points of the course "starter Motor", introducing the basic methods of wiring, the project teaching plan with provision of the project materials. The teacher should divide the personnels into groups and appoint a team leader. Secondly, after the grouping stage, the students should work out the work plan of the group, and each member has his own task division, using the time in and out of class to study independently. Students are advised to collect the relevant materials, understand the concepts of the projects and prepare the necessary materials. Finally, prior to the stage of hands-on implementation of the project, teachers are responsible for the supervision of the implementation process. Teachers should make a tutoring to each group for clarification of the procedures, and the error checking. Guidance from the teachers is necessary to ensure a successful operation of the project. Teachers should play a leading role in the project by maintaining a balanced working schedule, ensuring the carrying out of the teaching plan and answering the questions of the students when necessary. While completing

their own teaching task independently, students should pay attention to mutual communication and discussion, constantly improving the methods and strategies for implementing the project. Students are not suggested to report their questions to the teachers without independent thinking. Meetings are encouraged for group discussion and group studying for the optimized approach adopted in the implementation process[8].

3.4 Summary and evaluation of projects.

After the completion of the project, each student should write a summary of the project completion process according to the personal experience of the project. The summary should be complemented with a gathering of the practical experience and a theoretical framework for the approaches adopted. The group leader should write the project summary of the group, making a demonstration of the work to the class about the project ideas and descriptions of the process for about 30 minutes. Teachers are the organizers of the presentation, making comments about the potential errors such as the error in wiring, the installation of unnecessary wires, loopholes of the mechanism. Teachers and students are allowed to point out the potential problems, and make questions and group discussions for collective studying. Finally, the teachers evaluate the advantages and disadvantages of the three groups, focusing on summarizing and viewing the knowledge used in the project, so as to deepen the students' understanding and memory of the knowledge in order to achieve a framework of each knowledge point[9].

4. Problems needing attention in the application of project-based teaching method

4.1 Higher requirements for teachers.

Although the project teaching method emphasizes the subjectivity of students and change the roles of teachers from "lecturers" to "instructors", there are also certain requirements for the teachers.

Teachers should not only be proficient in professional theory and practical skills, but also know how to use teaching methods flexibly. For example, if students encounter difficulties in the process of completing the project, teachers should make sure that the guidance is accessible and clarified. The guidance given should also be enlightening, which can not only make students remember knowledge points deeply, but also motivate an active thinking, stimulating students' innovative ability.

Teachers should not only be able to organize and manage the implementation of teaching tasks, but also collect advanced and practical knowledge from many aspects and apply it to the project teaching method. For example, to inspect and practice in a military factory associated with the electrical major, the project teaching method used had better be in accordance with the project of military factory, or even directly implemented by the military factory. Teachers should adapt the classroom to the actual working scenario of the military factory as much as possible, and make an integration of the two occasions[10].

4.2 The summary and evaluation of the project should be fair and impartial.

When the evaluation results of the project are included in the overall evaluation results of the students, and even in association with the grading of the students such as awarding the "outstanding students" and other merit awards, the impartiality of the project evaluation is particularly important. Teachers should establish the scoring standard of each project, refine it from 5 aspects of knowledge, 4 aspects of ability, 3 aspects of quality. Each part of the evaluation should be precisely scored and made into a table. In order to better reflect the scientific nature and impartiality of the evaluation, the students first evaluate themselves through the scoring criterion, which helps to promote students to study independently and conduct self-reflection. Students are then instructed to evaluate each member of the class under the guidance of the teachers, providing positive feedbacks on the work of each student. The evaluation would give students a more clear understanding of their own strengths and weaknesses. Finally, after the scores are collected by the teachers, the average score would be

graded as the overall level of achievement of each student’s project.

4.3 Correctly handling the relationship between project teaching method and other teaching methods.

Project teaching method is a popular and effective teaching method in the current society, and it will be widely used in military vocational education. Teachers must have an objective and accurate understanding of the project teaching method, and should not think that professional courses must be taught by the project teaching method. A falsified application of the method would result in an ignorance of other teaching methods such as the traditional teaching method, which leads to the exclusion and rigidity of teaching methods. Although the project teaching method has its own advantages, it cannot replace other teaching methods. Other teaching methods also play a unique role in cultivating students' quality and increasing theoretical knowledge. Therefore, according to the specific content of the course and the characteristics of the students, we should make full use of a variety of teaching methods, such as project teaching method, task-driven method, and behavior-oriented method and so on.

With the innovation and development of the reform of military vocational education, we will constantly strengthen the combination of teaching and training with the professional needs of military posts, and deeply explore the application of project teaching method in the electrical courses of special vehicle repairmen, in order to make contributions to the training of more special vehicle maintenance talents with excellent professional accomplishment and post ability.

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