

Research on the Application of Inquiry Learning Method in the Course of "Automobile Inspection and Fault Diagnosis Technology" in Vocational Education

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ABSTRACT

Combining its theory with practice closely, the course of "Automobile Inspection and Fault Diagnosis Technology" is highly comprehensive. Based on the characteristics of the course, it's conducted in-depth research on the connotation, theoretical basis and significance of inquiry learning, which makes a useful exploration of how to apply inquiry learning in teaching practice according to the teaching rules of vocational education. Although the basic activities and characteristics of inquiry learning are consistent, the inquiry modes adopted are also different because of different inquiry content (courses), subjects (objects), etc., in the application of inquiry learning.

Keywords: troubleshooting, inquiry learning, teaching practice

1. INTRODUCTION

The course "Automobile Inspection and Fault Diagnosis Technology" is an application-oriented course that combines theory and practice closely for automobile inspection and maintenance technology majors in vocational education colleges. The course is highly comprehensive, requires high theoretical literacy, and is difficult to organize. In the course teaching, we aim to cultivate students' failure analysis and judgment ability, explore the use of "inquiry learning method" to organize teaching, and have achieved good results.

2. CONNOTATION AND THEORETICAL BASIS OF INQUIRY LEARNING

"Inquiry learning refers to a learning method in which students imitate the process of scientific research to learn scientific content, experience, understand and apply scientific research methods, and obtain scientific research capabilities" [1]. This learning theory was first proposed by American Dewey. Schwab, as an advocate of inquiry learning, believes that inquiry learning is a combination of scientific concepts, scientific methods and scientific attitudes, and emphasizes that "inquiry learning" is "teaching through inquiry". Inquiry learning has become one of the more important and influential methods in education in all countries in the world, and it is also a kind of teaching method that is widely used in our country's vocational education system.

The theoretical basis of "inquiry learning" includes: cognitive development theory, cognitive structure theory,

constructivist learning theory, and humanistic learning theory. Cognitive development theory believes that "the purpose of learning is to master the procedures and methods of solving problems in the interaction with the environment" [2]; cognitive structure theory believes that "students' learning is a process of active discovery" [2]; Constructivist learning theory believes that "learning is a process of active construction by students, and prior knowledge, context, and learning community are important factors that affect this process" [3]; humanistic learning theory believes that "learning is individual-centered And process-oriented, learning should reflect experience and participation" [1]. The main idea embodied in these theories and the "inquiry learning" method itself is to encourage learners to learn independently and to highlight the process of learners' participation. This is exactly the educational philosophy that vocational education needs to advocate vigorously. The course of "Automotive Detection and Fault Diagnosis Technology" requires students to be able to comprehensively use the knowledge of automotive electrical and electronics, structure and principles they have already mastered, and to apply the "exploratory learning method" in teaching, which is conducive to enhancing students' interest in learning and inspiring students' initiative to learn independently ; Conducive to enhance understanding and memory, to lay a deep mark on students; help students to analyze and solve problems and cultivate and improve the ability of comprehensive application. To form a scientific explanation and accurate judgment of automobile failures, it is necessary to comprehensively use relevant knowledge of automobile structure and principles to conduct systematic analysis, reasoning and judgment. This is exactly the quality and ability required and necessary for students in post-graduation practice.

Inquiry learning includes five activities: (1) Asking questions. Teachers put forward questions that need students to explore and research based on the content of the inquiry, and students start exploring activities around scientific issues based on the questions raised by the teacher; (2) Collect information. Students collect data and materials to obtain scientific evidence that can help them explain and evaluate the questions raised by the teacher; (3) Form an explanation. Based on previous knowledge and comprehensive evidence, students form an explanation and answer the "question"; (4) express the result. Students elaborate, demonstrate, and communicate their explanations and make clear conclusions; (5) Evaluation results. Students evaluate their own explanations by comparing other possible explanations, especially those with scientific theoretical support, and link the explanations with relevant theoretical knowledge. The teacher comprehensively gives an objective and scientific evaluation based on the students' conclusions.

3. APPLICATION OF INQUIRY LEARNING IN THE TEACHING OF "AUTOMOBILE DETECTION AND FAULT DIAGNOSIS TECHNOLOGY"

The course of "Automobile Inspection and Fault Diagnosis Technology" is a major professional course. The teaching goal of the course is to enable students to understand vehicle inspection technology, familiar with relevant national standards for automobile inspection, familiar with automobile fault diagnosis related technologies, and master fault diagnosis methods. To form troubleshooting skills, the course focuses on cultivating students' ability to analyze and judge failures. "Fault" is the object of reliability research and is for repairable products. Automobile failure refers to an event or state in which parts of the various systems of its chassis cannot or will not be able to complete the specified functions. The process of analyzing and judging automobile failure is essentially the process of investigating the work of various automobile systems. The application of "Inquiry Learning Method" in the course teaching of "Automobile Detection and Fault Diagnosis Technology" should focus on giving full play to the main role of students and fully mobilizing students' initiative and enthusiasm. The five aspects of the "Exploratory Learning Method" must be based on actual cases and comprehensively consider students' cognitive abilities. In the link of raising questions, it is necessary to combine the actual failure cases of the car. The elements of the case should be complete, especially the elements of the knowledge points for analyzing the failure, such as the mileage of the vehicle, whether the maintenance is standardized, the environment at the time of the failure, the driving level of the driver, and the operation at the time. Can provide clues for students to analyze the failure. For example, the failure phenomenon of vehicle body swinging is explored and studied. At the stage of raising questions, students should be given time to collect data and analyze

when the course is about to end that day. In addition, the teacher should accurately describe the failure phenomenon, such as: "A 2014 Jetta, after driving 200 kilometers on the highway at a speed of 90-110 kilometers, get off the highway, and after driving 40 kilometers at a speed of 50-70 kilometers on the provincial highway, The vehicle swayed slightly when driving in a straight line, which was more obvious at 50 kilometers per hour, but the phenomenon was reduced after speeding up. The highway was in good condition, and some sections of the provincial highway were slightly damaged, and the vehicle mileage was 80,000 kilometers. Please go back. Analyze this phenomenon and put forward troubleshooting suggestions." In the information gathering stage. Teachers can divide students into study groups of 5-6 people according to their basic knowledge mastery and the analytical abilities shown in the course. They can appoint a group leader or the students themselves recommend the group leader to divide tasks. Teachers need to guide students to collect and categorize the elements that constitute the phenomenon of car body swing based on the relevant knowledge of structure and principle, hydraulics, machinery, electronics, etc., and find out the components and forming factors that can affect the body swing . Form the explanation stage. This stage is arranged at the beginning of the next class. The teacher organizes discussions and speeches in the study group. The members of the group speak according to their respective tasks, analyzes the factors that form the phenomenon, and finally forms the group. The final conclusion. At this stage, the teacher should not just be a bystander. First of all, he must pay attention to maintaining the order of the classroom. The groups should not be confused, talk and discuss at will, or even quarrel. The teacher should participate in the discussion of each group, record the performance of the students, check the speech materials of the students, and correctly guide the speeches with large deviations to prepare for the next stage. Express results stage. According to the situation of each group discussion, the teacher asks each study group to assign a student to communicate the conclusions and theoretical basis of the group. To avoid similarities, the group with insufficient discussion can be allowed to speak first, or the group that speaks later can supplement Speak. Evaluation results stage. Based on the analysis and presentation of each group, the teacher makes comments and gives an evaluation, and makes a conclusive summary. For example, for this failure case, the following summary can be made: "You can see from the phenomenon that when the vehicle is traveling at 40 per hour at about 50 kilometers, the car body swayed severely, indicating that the car body formed a resonance at this operating speed. According to the basic knowledge of the structure, we can analyze the connection relationship between the components of the driving system and the steering system and the working process. Further combined with the relevant knowledge of the car toe, a comprehensive analysis is carried out. The car body swinging phenomenon is mainly due to the resonance of the car body in a certain speed range. There are three main influencing factors, namely the incorrect adjustment of the

toe and the steering ball the head wear is serious and the steering shaft gap is too large. From the conclusions of each group, the first group noticed the changes in the vehicle mileage and road surface, but ignored the serious wear of the steering ball head, which caused the excessive gap." Through teaching practice, the use of inquiry teaching methods to organize the teaching of "Automobile Inspection and Fault Diagnosis Technology" can not only stimulate students' interest in learning, promote students' active thinking, but also cultivate and improve students' ability to comprehensively use the knowledge they have learned to analyze and solve problems, The teaching effect is very significant.

4. SUGGESTIONS THAT SHOULD BE GRASPED IN INQUIRY LEARNING

4.1. Pay Attention to Relationship between "Content" and "Process"

Since the goal of vocational education talent training is to cultivate post-skilled application talents, when using the inquiry learning method to organize teaching in the "Automobile Inspection and Fault Diagnosis Technology" course, we should focus on two dimensions, namely "content" and "process." , The content answers "what", and the process is to teach students "how to do". Neither simply explore the "content", nor can it one-sidedly pursue the "process", and we must organize process teaching or process teaching with content. For example, when studying the failure of "difficulty in starting a vehicle", it is necessary to ask questions, describe the detailed phenomenon of difficulty in starting, and guide students to use the knowledge they have learned to analyze the cause. At the same time, students must also observe the failure through actual vehicles. The process and phenomenon that occurred; it is necessary to summarize and evaluate the conclusions of each group of students, and give a scientific and reasonable explanation, and it is necessary for the students to verify the conclusions in the troubleshooting of the actual vehicle through their own hands, so as to effectively train the students to comprehensively use The learned knowledge can analyze problems and solve practical problems by hand to achieve the true purpose of course teaching.

4.2. Focus on Relationship between Basic Theory and Skill Training

Inquiry is the process of exploring and verifying scientific issues. The foundation of inquiry learning is the necessary theoretical support, but the fundamental purpose of inquiry is application. Therefore, in the course of "Automobile Inspection and Fault Diagnosis Technology", the inquiry learning method must be used to organize teaching. It is necessary to focus on the exploration and learning of

practical problems on the basis of the related theories of automobile construction. It is neither possible to organize the inquiry learning into a pure inquiry into knowledge, nor to turn the inquiry learning into a training of operating skills. For practical problems, we must pay attention to exploring the "why" to do this, and for theoretical problems, we must pay attention to its practical application, so that the organic combination of theory and practice can be realized in the process of inquiry learning.

4.3. Pay Attention to Relationship between Students' Independent Learning and Teacher Guidance

"The ideal inquiry learning classroom should be a dynamic system full of moderate competition and obstacles. Teachers give students space and rights to explore and express ideas, and participate in questioning and discussion" [1]. When using the inquiry learning method to organize teaching, the teacher should give students the freedom to review, discuss, and debate in response to the question of inquiry, but this does not mean that the teacher can leave it alone. The teacher should follow the progress of each group. In accordance with each step of the inquiry learning, conduct timely guidance, guidance and inspiration, and always control the sections and the classroom atmosphere and progress. Only in this way can the purpose of inquiry learning be achieved.

4.4. Stress Formulation of an Inquiry Learning Plan Suitable for the Teaching Object

The organization and implementation process of inquiry learning is based on students, but the teacher must play its leading role. Therefore, the implementation of inquiry learning requires teachers to make sufficient teaching preparations before class and make a more detailed teaching implementation plan. Teachers must interpret the content of the curriculum and the requirements of teaching goals, set the goals of inquiry learning; understand and master the basic situation of teaching objects and equipment, analyze the psychological characteristics of students; design and research the problems of inquiry, and organize the resources of inquiry learning; Preset possible problems in the process of inquiry, create an environment for inquiry learning, etc. In accordance with the principle of deep military-civilian integration, establish a military-civilian integrated military vocational education authority and leadership organization composed of both military and local parties, accelerate the promotion of military-civilian coordination of professional layout and structure, formulate complete supporting mechanisms and policies, and realize military-civilian integration of military occupations The integrated management and leadership of education work provides decision-making consultations and suggestions for solving the problems of military-civilian integration of military vocational

education and the formulation of military vocational education plans, and supervises the effective implementation of military-civilian integration of military vocational education.

5. CONCLUSION

Although the basic activities and characteristics of inquiry learning are consistent, the inquiry modes adopted are also different due to different inquiry content (courses), subjects (objects), etc. in the application of inquiry learning. It requires us to conduct the in-depth discussion and research in different courses. The integrated management and leadership of education work provides decision-making consultations and suggestions for solving the problems of military-civilian integration of military vocational education and the formulation of military vocational education plans. Only in this way can the inquiry learning be achieved.

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