Research on the Integrated Education Mode of High-tech Integration in Automobile Inspection and Maintenance Specialty

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Abstract. With the arrival of the new century, China's automobile industry has achieved rapid growth and reached the standard of a world automobile power. Therefore, China's requirements for the quality of employees in the automobile industry are getting higher and higher. Many higher vocational colleges have set up automobile inspection and maintenance majors and trained a large number of graduates with high comprehensive ability. In order to adapt to the change of automobile maintenance industry and improve the quality of training skilled talents, the integrated education reform of automobile maintenance specialty in technical colleges has been carried out. However, there are still some shortcomings in the implementation of the integrated education reform, which fails to fully show its advantages in the training of skilled talents. This article mainly studies the application of the integrated education mode in the automobile repair major of secondary vocational and technical schools. Firstly, starting with the basic concepts of the integrated education mode, combining with the characteristics of its implementation in the education process, it focuses on the necessity of using the integrated education mode. The increasing demand for high-quality technical talents in modern enterprises has seriously exposed the drawbacks of the traditional "instillation" education method, which focuses on storytelling. This requires teachers to attach importance to innovation and reform outdated education methods. Among them, the application of integrated education mode in the education of automotive testing and maintenance majors plays an important role in improving education quality.

Keywords: Vehicle testing; Maintenance discipline; Integrated education.

1. Introduction

The continuous development of automobile technology has promoted the development of automobile inspection and maintenance technology. Modern automobile maintenance workers should not only have rich experience, but also master a lot of modern scientific and technological knowledge [1]. At present, the proportion of technicians and senior technicians in China's auto repair industry is less than 8%, and they are all older (senior technicians account for 28% and technicians account for 37.5%), and their knowledge structure is aging, so it is difficult to transform into the maintenance work of new types of vehicles; The service object, vehicle source, vehicle type and maintenance operation mode of automobile maintenance industry have changed a lot, the technical content of automobile maintenance industry is constantly upgrading, and the concept, technology, operation mode, system and personnel structure are changing [2]. Integrated curriculum reform is a education activity that aims at cultivating comprehensive vocational ability, constructs a curriculum system through the analysis of typical tasks, and takes specific work as the learning carrier, and designs and arranges according to the working process and learners' autonomous learning requirements. The integrated education reform of automobile maintenance specialty in technical colleges is an important way to improve the ability to serve the regional economy and improve the quality of personnel training [3].

Automobile inspection and maintenance is a highly practical specialty that requires students to master both rich theoretical knowledge and good practical skills. Therefore, the traditional education mode cannot meet the professional education requirements, which requires teachers to adopt education methods that are conducive to promoting student development. As an efficient education

method, the integrated education mode has been widely used in the education of automobile inspection and maintenance specialty, making great contributions to improving the education quality and effectiveness, and promoting and promoting the comprehensive development of students, Laying a solid foundation for students to move to work in the future [4]. The vocational activity oriented curriculum is a curriculum system built on the basis of systematic analysis of the work process of job groups with certain technical content in a certain industry, refining and forming the professional abilities of job groups, and combining relevant national vocational qualification standards.

The course is based on the production, service, operation and management activities of typical products in the front line, integrating theory and practice, and cultivating professional technical ability and professional key ability. Students have the basic ability to work in certain technical posts through the implementation of project-based education, scene-based drills at work site, role-playing and other education methods, and form a good professional quality [5]. According to this, they have certain professional latent ability and professional development ability [6]. Judging from the current employment situation of students majoring in automobile maintenance in technical colleges, students can't adapt to the employment needs of enterprises in time after they take up their jobs, and the first-time job loss rate and job transfer rate are too high. The main reason for this problem is that there are still many shortcomings in the process of integrated education implementation of automobile maintenance specialty in technical colleges, which leads to the fact that students' comprehensive professional ability and enterprise talent demand still can't completely match [7]. To improve this phenomenon, we must optimize the integrated education, so as to better meet the actual needs of skilled talents in automobile maintenance [8].

Therefore, in order to give full play to the role of the "education and doing integration" education model and improve the education quality of the automotive inspection and maintenance technology specialty, schools should strengthen the importance of the education work of the automotive inspection and maintenance technology specialty, formulate scientific and reasonable education objectives and plans based on the education content, transform traditional educational concepts and methods, and achieve progress with the times. Moreover, the "integration of education and practice" education model can better close the relationship between students and teachers, create a good classroom learning atmosphere, and achieve the progress and development of students.

2. Application of "Teaching and Doing Integration" Teaching Mode in Automobile Inspection and Maintenance Technology Major

2.1. Set education objectives based on education, learning, and doing

At present, there are some problems in the establishment of education objectives of many courses in China, which are not conducive to the learning of education knowledge and hinder the progress and development of students. Therefore, in order to meet the development requirements of students and promote their progress and development, teachers should study and analyze the education work according to the actual education content and the three contents of education, learning and doing, set scientific and reasonable goals and ensure the smooth progress of the classroom [9]. The implementation of integrated education mode has obvious characteristics in the whole education process, which is very different from the traditional education method in secondary vocational schools. Integrated education mainly refers to the education mode of integrating theoretical training, which is very similar to the current "task-driven education" and "project-oriented education" models. In fact, it is to adhere to the basic principle of putting practicality first in practical occupations, take the actual working process as the education orientation, and take the training of students' professional skills as the whole education core, thus effectively combining theoretical education with practical working skills training [10]. Through comprehensive research and scientific analysis of the professional position system, in the professional development of knowledge and skills, through the establishment of different modules such as integrated education, professional skills training, and quality assurance, in order to achieve the smooth implementation of the "integrated education model",

it is necessary to accelerate the development of classroom, theoretical foundation virtual laboratory, and factory based on the original curriculum resources, The integration of resources such as professional time in cooperative positions provided by schools and enterprises will lay a material, platform, and resource foundation for the smooth implementation of the integrated education model in industrial schools. Guide and supervise learning activities and processes; Be able to choose integrated curriculum content; Be able to design and provide learning resources such as worksheets; To be able to improve learning activities and learning outcomes.

In vocational colleges, there are only a handful of integrated teachers who meet these conditions. The cultivation of soft quality of enterprise work is also the key point in the process of integrated education. By creating a corporate culture that is in line with the actual enterprise, students can develop their professionalism, cooperation and organizational ability as your qualifications and abilities. It can be independent of teachers' education, but in practice, it can be practiced in a professional environment, so that students can feel the influence of corporate culture and develop their own business. Therefore, under the integrated education mode, it is necessary to highlight the importance of corporate culture and corporate information provided. By designing the slogan of corporate culture and posting it in each training classroom, the training atmosphere of the whole training process is added. In addition, teachers should carry out education activities closely around education objectives and tasks, strengthen the cultivation of students' post adaptability, and comprehensively improve students' creative ability and analytical ability.

2.2. Planning education content according to education objectives

The quality of education content directly determines the quality of education and is closely related to the learning of the entire curriculum knowledge. When carrying out the "integration of education and learning" education work, teachers should plan and arrange the entire education content of the course based on the previously set education objectives, ensure the smoothness of the overall course, and improve classroom education efficiency. Most middle and high vocational schools in China lag behind in their education concepts and methods in cultivating vocational talents. Many vocational talents cannot meet the basic needs of the social workplace after entering the society, especially in terms of practical operation and workplace quality, which is far from being a qualified professional talent. Under the existing education system, there is a big gap between the education mode and the new curriculum standard. The integrated education mode adopts the seamless education mode of enterprise workplace, and the education content is also the first-class technology at the forefront of the workplace. For students, their learning enthusiasm is not only improved, but also their learning skills and mastery ability can meet the basic needs of the market. After completing the school education, they can quickly enter the workplace and adapt to the needs of the workplace and themselves. In recent years, there are many seminars and symposiums on vocational education in China, especially under the construction of modern vocational education system with China characteristics, people pay more attention to the talent training mode and its corresponding curriculum system in secondary and higher vocational schools. For practical training, teachers can focus on letting students practice and operate, so that students can improve their professional and technical abilities, combine theory with practice, and realize learning and development.

Teachers should pay more attention to evaluation work. Through education summary and evaluation, teachers can not only grasp the learning situation of students, facilitate more targeted work, but also achieve a reasonable evaluation of teachers' education ability and level. Set up majors based on social employment needs, offer courses based on job content, timely adjust education content based on changes in the employment market, and build a competency based and employment oriented vocational activity curriculum system that integrates several elements of the curriculum, such as "goals, content, activities, methods, time, space, and resources". While cultivating students' employability, it also takes into account students' career development, It is in line with the new trend of curriculum reform in the field of vocational education today. It should be noted that in response to the reform of national education policies, schools can focus on practical courses, appropriately

reducing theoretical courses, with theoretical content related to vehicle testing and maintenance technology accounting for 40% and practical operation content accounting for 60%. This aims to cultivate students' hands-on operation ability and mobilize their enthusiasm. In addition, teachers should regularly summarize and evaluate their education work, which can not only facilitate the communication between teachers and students, but also achieve the development of teachers and students.

3. Research on the Integrated Education Model of Middle and High Level Penetration in Automobile Inspection and Maintenance

3.1. Optimization Practice of Integrated Teaching for Automobile Maintenance Major in Technical Colleges

Students in vocational schools often have a poor foundation in cultural courses. Faced with various cultural courses (Chinese, mathematics, English, politics, physical education, etc.) in the first year, most students will feel bored. Later, the school added a lot of professional knowledge, such as basic courses of automobile specialty and professional courses of automobile maintenance and repair. This not only lays the foundation for the second year's professional study, but also makes the first year's students' study more interesting. Overhaul of Engine Electronic Control System is a professional core course for automobile maintenance major in technical colleges, and it is also a practical technology and skill course for students to use directly in production practice in the future. This course focuses on the detection and maintenance of each component circuit of automobile engine electronic control system, organizes the education content according to the needs of automobile maintenance enterprises, and improves the professional ability of the post. Teachers import tasks, import language: A car equipped with Baojun B15 engine appears the fault phenomenon of unsmooth acceleration during use and enters the shop for maintenance. After preliminary inspection, maintenance personnel find that the engine fault indicator light is always on, and after detection by a scan tool, it is found that there is a "P0105 manifold absolute pressure (MAP) sensor circuit" fault code. On the basis of in-depth analysis of the circuit, maintenance personnel need to work out the maintenance process reasonably, use the measuring tools such as fault diagnosis instrument, multimeter and auxiliary test line correctly, find out the cause of the fault and adopt maintenance measures reasonably. Students listen and record.

Functional analysis is the main line of troubleshooting for automotive electronic control systems. Students first collect functional information on the intake manifold absolute pressure sensor circuit in a small group to cultivate their information collection ability. Then, through the teacher's summary, they construct a cognitive system for the functions of electronic control components, while laying the groundwork for completing work tasks; Through students searching for and disassembling the intake manifold absolute pressure sensor according to the illustrations in the textbook, the learning effect is deepened in a "learning by doing" manner, laying a foundation for maintenance work. Students will draw the circuit diagram of the intake manifold absolute pressure sensor from the maintenance manual. During the process of student disassembly, the teacher should remind students not to ignore the color, code, and connector terminal number of the wire. Complete components should be drawn with solid lines, incomplete components should be drawn with dotted lines, and components should be labeled with names.

An open circuit in a circuit means that the resistance of the circuit is infinite, so the detection methods for an open circuit in a circuit and excessive resistance in a circuit are the same. The two fault points of an open circuit in circuit 915 and excessive resistance can be combined and written as an open circuit in circuit 915/excessive resistance in circuit 915. Therefore, the maintenance sequence for the low level reference voltage section is: Is line 915 open/excessively resistant? Replace the ECM. The maintenance plan for the low level reference voltage section is shown in Figure 1.

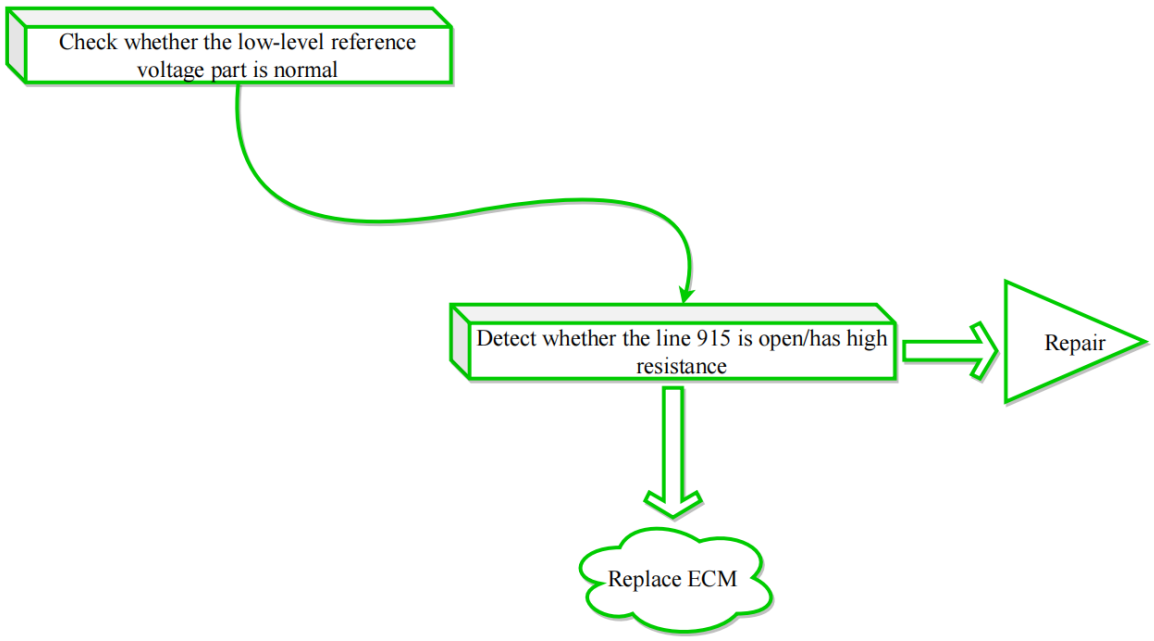

Figure 1 Maintenance Plan for Low Level Reference Voltage Section

Combined with the maintenance process of open circuit/excessive resistance of line 915 in Figure 1 above, the maintenance process of low-level reference voltage part is shown in Figure 2.

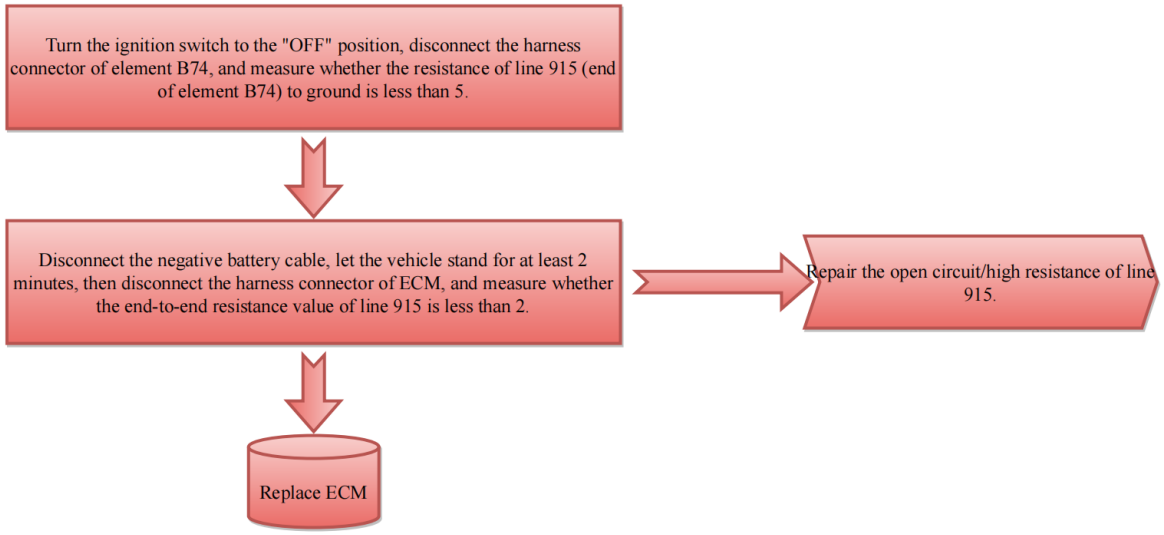

Figure 2 Maintenance process of low-level reference voltage part

Define the testing basis (the end-to-end resistance of line 915 is less than 2 Ohms) → Analyze the preparation before testing (separate line 915 from the circuit, that is, disconnect the harness connectors of component B74 and ECM respectively) → Define the safety operation specifications (first, disconnect the harness connectors of component B74 only after the ignition switch is placed in the "OFF" position; second, place the ignition switch in the "OFF" position) Location: Disconnect the negative battery cable and allow the vehicle to stand for at least 2 minutes before disconnecting the ECM harness connector. The arrangement is as follows: Place the ignition switch in the "OFF" position, disconnect the negative battery cable, and leave the vehicle standing for at least 2 minutes. Disconnect the harness connector of element B74, disconnect the harness connector of ECM. Measure whether the end-to-end resistance of line 915 is less than 2 ohms. If the resistance is less than 2 Ohms,

it indicates that line 915 is normal; If the resistance is infinite, there is an open circuit in line 915; If the resistance is greater than a certain value of 2 Ohms, there is excessive resistance in line 915.

3.2. Suggestions on the application of integrated education mode in secondary vocational schools

In the process of constructing the course system of automobile operation and maintenance specialty, the education mode of integrating theory with practice is adopted, and the whole education process is strictly managed according to the specific requirements of the actual work items of enterprises, thus the course content selection and learning situation education design with the completion of typical work tasks (projects) as the carrier of learning knowledge and skills are clarified. The 2.5+0.5 talent training program is implemented, with five semesters of study on campus and one semester of off-campus internship. The education time of each semester is 20 weeks (including review exams), from the first semester to the fifth semester, the education week of each semester is 18 weeks, and the mobile week is 2 weeks, with 30 hours per week. The future employment will be guided by the basic needs of the auto repair industry, so as to cultivate compound talents with all-round development in morality, intelligence, physique and aesthetics, and cultivate new century talents with healthy physical and mental growth, rich professional knowledge, excellent technical level, good professional ethics, honest professional quality and excellent professional team cooperation ability, so that they can master basic theoretical knowledge and practical skills, and improve high-quality applied talents with multiple occupations and jobs in this field, such as automobile maintenance, fault analysis and detection and even automobile sales.

Integrated education focuses on matching the production standards of enterprises. Therefore, in the development stage of education materials, it is necessary to strictly combine the actual production of school-enterprise cooperation, give full play to the advantages embodied by each other in the process of cooperation, and achieve school-enterprise cooperation and work-study cooperation, so as to achieve zero distance between school education and the actual work needs of later students. The fundamental task of vocational education is to cultivate skilled talents with strong practical and vocational abilities, and practical training is the key link in cultivating this ability. The virtual training system for automobile repair is a computer program that uses a combination of two-dimensional and three-dimensional simulation to demonstrate the daily maintenance process for several types of vehicles, detect and eliminate detected faults, and enable students to use desktop computer virtualization to conduct hands-on training exercises to master the required methods for using detection instruments and troubleshooting methods, After practice, simulation assessment can also be conducted. The teacher can manually set partial faults for some maintenance points, or randomly set them. Students can use the assessment method to assess and score their learning, and continuously improve their practical training ability.

Therefore, based on the integrated education mode, students' operational skills should be objectively evaluated by process assessment, which is a new evaluation mode integrating teacher evaluation, group mutual evaluation and students' self-evaluation. In the process of assessment, students who fail in unit scores need to be given compensatory study until the students pass the examination. In addition, after the end of the course education, teachers should organize an assessment team to assess and evaluate the students' learning achievements under the integrated education mode, and comprehensively track and understand the education effect by means of questionnaire survey, or hold lectures and symposiums to master teachers' suggestions and opinions on the education mode, gradually deepen the integrated evaluation system, and realize the goal of evaluating the education quality and effect in the whole process.

4. Conclusions

With the rapid development of the national economy and the progress of the automobile industry, the number of cars keeps rising, which is followed by the increasing demand for automobile

maintenance professionals in the market. The implementation of integrated education reform is a education reform activity carried out by technical colleges under the guidance of Ministry of Human Resources and Social Security in response to the changes in the automobile maintenance industry. Its main purpose is to improve students' comprehensive vocational ability. However, as a new education mode, it must go through the process of implementation, perfection, optimization and revision to meet the market demand. This article mainly studies the application of integrated education mode in automobile repair majors in secondary vocational and technical schools. Firstly, starting with the basic concept of integrated education mode, it introduces the basic concept of integrated education in detail, and believes that integrated education mainly refers to the following learning contents: typical work tasks, learning methods based on the work needs of actual enterprises, and education objectives aimed at comprehensively improving students' professional skills The ability to solve problems and the soft power of social needs. From the above, it can be seen that the education model of "integration of education and practice" has important significance for educational and education work, can achieve the cultivation and education of more professional and technical talents, and meet the development needs of society.

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