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Teaching Strategies for Automotive Engine Electronic Control System Testing and Maintenance Course under the "1+X" Certificate System

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Abstract: With the continuous development of China's economy, cars have become the most common means of transportation for people. However, due to this impact, the contradiction between the market demand for after-sales services such as car testing and maintenance and the actual supply of professional technical personnel has become increasingly prominent. Therefore, strengthening the education reform of automotive inspection and maintenance professional technology has become an important task for major vocational colleges. The "1+X" certificate system has become a new norm in vocational education reform in China due to its significant advantages in cultivating students' professional knowledge and skills to obtain professional skills certificates. Based on this, this article takes the course of automotive engine electronic control system testing and maintenance as an example to explain the practical significance and strategies of course teaching based on the "1+X" certificate system, aiming to further promote professional teaching reform and provide some reference for colleagues.

Keywords: Higher vocational education; "1+X" certificate system; Inspection and maintenance of automotive engine electronic control system; Course teaching

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1. Introduction

"1+X" refers to "educational certificate + several vocational skill level certificates" [1]. "1" corresponds to academic certificates, which is actually a reflection of students' comprehensive literacy and basic cultural qualities, including their thinking ability, cultural foundation, judgment ability, and other overall abilities [2]. "X" corresponds to vocational skill level certificates, and its essence is an important "certificate" for students to enter the professional field, which can represent their vocational and technical abilities, innovation and entrepreneurship abilities, and practical operation level to a certain extent [3]. In short, teaching activities guided by the "1+X" certificate system are an effective connection between "academic education" and "vocational

and technical education." They can cultivate many versatile vocational and technical professionals, which is conducive to solving problems such as "employment difficulties" for students and the shortage of vocational and technical talents in the market and are of great significance. This article mainly conducts relevant analysis and research on the teaching of automotive engine electronic control system testing and maintenance courses based on the "1+X" certificate system.

2. The practical significance of teaching automotive engine electronic control system testing and maintenance course under the "1+X" certificate system

One is that it can effectively promote cooperation between schools and enterprises. For vocational colleges, school-enterprise cooperation is an important auxiliary means and teaching link for cultivating students' professional skills, and the implementation of the "1+X" certificate system can further promote cooperation and connection between schools and enterprises, which is conducive to providing students with more platforms and opportunities for internships and practical training in enterprises. Specifically, the "1" (academic certificate) in "1+X" is issued by the school, while the "X" (vocational skill level certificate) is issued by social organizations such as industries and enterprises [4]. Combining the teaching of automotive engine electronic control system testing and maintenance with the "1+X" certificate system requires teachers to simultaneously consider the relevant requirements of both schools and enterprises in actual teaching, and achieve a win-win situation for both schools and enterprises as much as possible. Therefore, from this perspective, the implementation of the "1+X" certificate system can effectively promote deep integration between schools and enterprises.

Secondly, it can greatly enhance students' subjective initiative in learning. The "1+X" certificate system is not only related to schools and enterprises, but also closely related to students. Generally, the design of the curriculum teaching system leaves students with a certain amount of extracurricular time for independent learning or professional skill training. However, in traditional teaching models, many students are often unclear about what they need to do outside of class and do not have a clear direction for their efforts. The implementation of the "1+X" certificate system can point out the direction of learning and effort for students, that is, to use their outside of class time to obtain professional skills certificates according to the "X" list. In this way, students can devote more time and energy to obtaining professional skill level certificates, which is conducive to further deepening their understanding and application of professional knowledge and skills, as well as providing more guarantees for their future employment and career advancement.

Thirdly, it can effectively expand students' employment opportunities. From the current perspective, compared to ordinary undergraduate colleges or research institutes, students graduating from vocational colleges are more likely to be in a relatively more disadvantage position in job competition. However, with the support of the "1+X" certificate system, it can provide a fair competition opportunity for students of the same major who graduated from different schools. This is because the professional vocational skills certificates represented by "X" are not only effective certification for students in a certain field of professional skills, but also proof of their abilities. When applying, these professional vocational skills certificates are a powerful bargaining chip for students to compete fairly with others.

3. Practical strategies for teaching automotive engine electronic control system testing and maintenance under the "1+X" certificate system

3.1. According to the "1+X" certificate system standards, improve talent training objectives

Influenced by traditional teaching ideas, some vocational college teachers still choose to carry out exam-

oriented education in order to achieve employment and enrollment rates, while ignoring the long-term development of students and not considering their self-development intentions [5]. This is contrary to the talent cultivation goals of vocational colleges in the context of the new era. In this regard, teachers should change their mindset in teaching, by combining the current social market and the employment needs of industry enterprises. With this, the teachers can deeply analyze and understand the importance of courses in the actual situation of enterprises and make appropriate changes. Then, they should adhere to the goal orientation of student development, set talent training goals, and achieve the cultivation of composite professional skilled talents. Specifically, regarding the course of testing and maintenance of automotive engine electronic control systems, it refers to the need for teachers to combine the characteristics of this course with the actual needs of enterprises for job professional abilities. In addition, teachers can construct a curriculum teaching objective system that is more in line with the requirements of talent cultivation in schools and the needs of enterprises based on this.

The core of the "1+X" certificate system mainly lies in the cultivation of composite professional skilled talents. Therefore, when teachers carry out actual teaching, they also need to change traditional teaching ideas. In addition to teaching basic professional knowledge and skills, it is also necessary to meet the target requirements of the current automotive industry's automotive application and maintenance vocational skill level certificate and other automotive vocational skill level certificates [6]. Students should be allowed to independently choose the scope of certificates they want to obtain based on their actual situation and preferences, and then further determine talent cultivation goals, course content design plans, etc., to ensure that teachers can effectively integrate vocational skill level certificates into daily course teaching.

3.2. Effectively integrating the "1+X" certificate standards and optimizing course teaching content

The implementation of the "1+X" certificate system still depends on the organic integration of academic certificates and vocational skills certificates [7]. Therefore, this requires teachers to be guided by the "1+X" certificate system, effectively connect vocational skill level standards with the curriculum standards for automotive engine electronic control system testing and maintenance, continuously optimize teaching content, fully leverage the advantages of school teaching resources, and pay attention to cooperation with relevant vocational skill level certificate organizations, to jointly research curriculum and textbook resources that are more in line with teaching reality.

Firstly, it is necessary for teachers to systematically sort out the course settings and go deep into car 4S stores to understand classic cases of engine electronic control system maintenance in cars. Then, combined with the module content in this course, teaching content should be reasonably added or deleted, and the course teaching content and corresponding vocational skill level standards should be sorted out.

Secondly, schools need to be able to update their textbooks on time. Nowadays, the iteration and updating speed of new processes and technologies is very fast, and the content and requirements of vocational skill level standards directly connected with them must always keep up with their development pace. Therefore, schools need to fully leverage the advantages of school-enterprise cooperation by building project-based teaching tasks and "Loose leaf" teaching manuals together. This is to better guide teachers to carry out course teaching based on the "1+X" certificate system [8].

Thirdly, it is necessary to provide students with a good platform for self-directed learning and practice to ensure the improvement of their professional abilities. For example, students can use automotive certification to develop a learning platform for organizations, and combine course resources to independently learn the training content of relevant vocational skill level certificates outside of class. Through deepening school-enterprise

cooperation, students can be led to understand and master more of the latest technology related to their major [9].

In addition, from the perspective of implementing course content, the industry standards or job standards corresponding to the detection and maintenance of automotive engine electronic control systems need to be adapted to the existing course content and system, and then appropriately add or delete course content in combination with teaching objectives to achieve a comprehensive integration of "course" and "certificate" [10]. In addition, many other professional qualification recognition standards can be incorporated into the automotive teaching project in this course, such as diesel electromechanical system maintenance, comprehensive fault diagnosis, engine electronic control system, etc. [11]

3.3. Based on the "1+X" certificate system, improve curriculum teaching methods

Choosing scientific and reasonable teaching methods can better help students improve their professional theoretical learning effectiveness and practical skills training effectiveness. It is conducive to the transformation from unilateral teacher output teaching to two-way interactive teaching between teachers and students while helping the cultivation of students' employability and job skills [12]. On the one hand, for courses with a high proportion of theoretical knowledge, teachers can try to use project-based teaching methods to break the drawbacks of single-course teaching. The purpose is to design the work process of student practice and training based on the teaching content and industry enterprise requirements and achieve synchronous teaching of professional theoretical knowledge and practical skills through training equipment, modern information technology, etc. On the other hand, for practical courses aimed at cultivating students' professional operational skills, teachers may take teaching objectives as guidance and incorporate some inspiring real cases of automotive 4S stores into their teaching. By stimulating the situation, students can explore the answers to questions independently under the driving force of problem and case studies, so that they can acquire professional theoretical knowledge and also achieve the development of their comprehensive professional abilities.

3.4. Building a diversified teaching evaluation system to improve the quality of talent cultivation

The diversified teaching evaluation system emphasizes the comprehensive evaluation of students' course learning situation [13]. Specifically, it can be achieved from the following three aspects:

(1) Firstly, the evaluation subject should be diversified, including teachers, students, parents, schools, and relevant social organizations. This can be achieved through teacher evaluation, student self-evaluation, peer evaluation, parent evaluation, school participation, and enterprise evaluation [14].

(2) Secondly, the evaluation content should be diversified. In addition to evaluating students' mastery and application of knowledge and skills, it is also necessary to evaluate their learning process, value cultivation, learning attitude, etc.

(3) Finally, the evaluation methods should be diversified, adhering to process evaluation as the main approach, supplemented by diagnostic evaluation and summative evaluation [15]. Diagnostic evaluation refers to the process in which teachers roughly understand the basic learning situation of students through surveys and other forms before the formal start of teaching. Process evaluation focuses on the teaching process, such as conducting delayed evaluations on students who have difficulty in keeping up in their studies. Timely adjustment of subsequent teaching plans based on feedback from classroom students is also considered under process evaluation. Summative evaluation refers to summarizing and evaluating the learning outcomes of students through written tests, practical training, and other methods after the end of teaching.

4. Conclusion

In summary, in the context of the new era, the teaching reform of the automotive engine electronic control system testing and maintenance course should be based on relevant skill level standards, integrating the "X" certificate training content with course teaching, to explore a new path of talent cultivation that is more in line with the development needs of the social market. Specifically, the talent training objectives can be improved based on the "1+X" certificate system standards. With effective integration of the "1+X" certificate standards and optimizing course teaching content, teachers can improve curriculum teaching methods. Building a diversified teaching evaluation system and improving the quality of talent cultivation are measures to achieve the integration of "academic education" and "vocational education and training", thereby achieving the dual improvement of curriculum teaching quality and student employment ability.

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