

Reforming the Teaching of New Energy Vehicle Maintenance Modules under the "1+X" Certificate System

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Abstract: *In the context of rapid development in the new energy vehicle industry, the demand for talents in new energy vehicle maintenance continues to increase. Improving the quality of new energy vehicle maintenance has become a key focus in vocational colleges' talent development efforts. In order to meet the requirements of the new energy vehicle industry and accelerate the training of high-quality skilled talents, vocational colleges need to continuously explore and innovate in the reform of teaching new energy vehicle maintenance modules under the "1+X" certificate system. This includes updating teaching content in a timely manner, innovating teaching methods and models, and continuously enhancing the quality of new energy vehicle maintenance talent training in vocational colleges by aligning with industry demands and talent development requirements.*

Keywords: *"1+X" certificate system; new energy vehicles; maintenance module teaching*

The State Council has issued an important reform measure, namely the implementation of the "1+X" certificate system. In this context, vocational colleges should adjust their talent development programs continuously and adopt the "1+X" certificate system to cultivate talents in the new energy vehicle maintenance module. This system aims to achieve organic integration between the "1" and "X" components, allowing students to apply the knowledge and skills learned in their majors to practical work. By actively promoting teaching reforms and cultivating high-quality new energy vehicle technicians with sustainable learning abilities and skills, vocational colleges can drive the development of the new energy vehicle industry.

1. The Connotation of the "1+X" Certificate System

"1" refers to academic certificates, while "X" refers to vocational skill level certificates recognized by nationally designated institutions. The "1+X" certificate system refers to a system design in modern vocational education that emphasizes the connection between academic certificates and various vocational skill level certificates. Higher vocational colleges play a crucial role in achieving the "1" certificate and serve as the main battleground for cultivating high-quality, high-level, and highly skilled professionals. Combining the "1" and "X" certificates is of great significance for improving the quality of vocational education and enhancing students' employability. Vocational skill certificates serve as evidence of the vocational skill levels of college graduates and members of society, reflecting the comprehensive qualities that students should possess in professional activities. In the "1+X" certificate system, the "1" certificate provides students with a solid foundation, while the "X" certificates enhance their skills, creating greater employment and entrepreneurial opportunities for university students and offering a new path to alleviate the structural contradictions in their employment.

2. Analysis of the Role of the "1+X" Certificate System in Practice

In the training program for automotive manufacturing and testing technology professionals, it is divided into two main categories: fundamental courses and core courses. The fundamental courses mainly cover the basic knowledge of automotive manufacturing and testing technology, which corresponds to the "1" component of the "1+X" certificate system. Currently, the implementation of the "1+X" certificate system faces several issues^[1]. For example, there is a lack of integration between the "1" and "X" components, the certificate knowledge is too scattered, the content in textbooks is not

comprehensive enough, and teachers tend to focus solely on theoretical knowledge during teaching, neglecting skills development. As a result, students are unable to achieve the organic integration of theoretical knowledge and practical skills, hindering the comprehensive improvement of their professional competence. In light of these issues, higher vocational colleges, enterprises, and students should reexamine the implementation of the "1+X" certificate system. Through in-depth research and analysis of various aspects of the "1+X" certificate system, the superiorities of the certification system can be maximized, waste of resources can be minimized, learning outcomes can be optimized, the relationship between academic qualifications and technical skills can be better coordinated, and the curriculum structure can be more reasonable. This will enable schools to achieve efficient teaching and enhance the overall capabilities of students^[2].

3. The Significance of the "1+X" Certificate System in the New Energy Vehicle Maintenance Module

The "1+X" certification system is a new vocational skill level system implemented in vocational education. It is beneficial not only for improving students' overall quality but also for enabling them to acquire more vocational skills. Based on the requirements of talent development, higher vocational colleges should actively promote the "1+X" certification system and further improve China's vocational education system to meet the needs of the new energy vehicle industry. By focusing on "professional technology" and "professional skills," high-quality talents that meet the requirements of social development can be cultivated. This allows students to proficiently grasp various knowledge and skills closely related to practical work during the learning process. Implementing the "1+X" certification system in the new energy vehicle maintenance module enables students to gain comprehensive understanding of the specialized knowledge and skills involved in this field. It effectively enhances students' overall quality and professional skills, laying a solid foundation for the development of their professional technical abilities. In summary, by cultivating talents in the new energy vehicle maintenance module through the "1+X" certification system, it can effectively promote students' professional ethics and overall quality, improve the quality of talent development and teaching, and provide society with a greater number of high-quality talents^[3].

4. Teaching Reform Strategies for the New Energy Vehicle Maintenance Module

4.1 Develop and Improve Teaching Content

In the context of the "1+X" certification system, higher vocational colleges should actively optimize the teaching objectives of the new energy vehicle maintenance module. The curriculum content should be effectively aligned with the "1+X" certification standards, making it an important task to enhance students' ability to obtain qualifications for new energy vehicle skill exams and highlighting the cultivation of students' vocational skills. Teaching content plays a critical role in talent development. The implementation of the "1+X" certification system requires adjusting and optimizing the curriculum content according to the requirements of vocational skill level assessment, ensuring that the curriculum aligns with job tasks and vocational skill assessment. Higher vocational colleges should incorporate skill training courses for new energy vehicles into existing automotive specialty curricula, with a focus on improving students' skill levels. By establishing a curriculum system that integrates courses and certifications, the professional technical standards of the new energy vehicle maintenance module can be incorporated, achieving consistency between the curriculum standards, national vocational skill level standards, and the "1+X" certification system.

When designing the curriculum content for the new energy vehicle maintenance module, higher vocational colleges should proactively align it with the requirements of the new energy vehicle vocational skill level certification standards. In-depth research should be conducted on the structure and principles of new energy vehicles, maintenance and inspection, and fault diagnosis and repair. Based on students' cognitive abilities, an action-oriented approach should be adopted to optimize and design the curriculum content. This breaks away from traditional teaching methods and enhances the quality of teaching by effectively motivating students' interest in learning cultural knowledge.

4.2 Facilitate Effective Classroom Teaching

Teachers need to change their traditional teaching concepts and methods, actively promote the

"1+X" certification system, and fully utilize information technology in the teaching process. The focus should be on cultivating students' vocational skills, stimulating their learning interests and enthusiasm, and promoting the development of their comprehensive qualities and professional skills, thereby improving teaching effectiveness and quality. Traditional teaching methods primarily focused on lecturing, which led to students being in a passive receiving state for a long time, affecting their enthusiasm for learning and undermining their motivation. Furthermore, the knowledge of new energy vehicles is diverse and complex, requiring teachers to organize teaching content in a reasonable manner based on the vocational skill level standards and the requirements of the "1+X" certification system. They should integrate the content with the professional knowledge learned and actively conduct efficient classroom teaching.

Theoretical knowledge in the field of new energy vehicle technology can be challenging for students to grasp due to its complexity and abstract nature. Therefore, teachers should emphasize the integration of theoretical knowledge and practical operation in the teaching process. They can assign useful tasks and provide more opportunities for practical activities to engage students, fully activating their learning enthusiasm. Teachers should strengthen the integration and utilization of information resources in the classroom by employing various teaching methods such as task-driven approach, case-based teaching, and situational teaching. Multimedia and the internet can also be incorporated into the classroom to allow students to learn and master knowledge through multiple channels, enhancing the quality and efficiency of classroom teaching.

4.3 Reform and Innovate Teaching Models

Vocational education aims to unify academic qualifications and skill levels, comprehensively cultivating professional competence, vocational skills, and knowledge levels, to further enhance students' comprehensive abilities. In traditional vocational education, teachers often focus only on imparting theoretical knowledge and skills to students while neglecting the cultivation of their comprehensive qualities and vocational skills. With the implementation of the "1+X" certification system, teachers can explore, improve, and innovate teaching models in the new energy vehicle maintenance module to meet the needs of the new energy vehicle industry. Emphasis should be placed on educating students about the new energy vehicle industry, as well as enhancing their practical skills and comprehensive abilities, to achieve higher teaching effectiveness and lay a solid foundation for cultivating professional technical talents in the field of new energy vehicles, ensuring the quality of talent development.

For example, higher vocational colleges can establish an information-based teaching platform that combines students' practical situations. This allows teachers to utilize the platform to construct an online teaching model that encompasses work tasks, vocational skills, skill requirements, and knowledge requirements. Through this online teaching model, students' active participation in the classroom can be stimulated, and the precise objectives of the teaching system can be achieved. Inviting professionals and industry personnel from relevant companies to give lectures in the school is also an innovative teaching method. It broadens students' horizons and helps them gain a comprehensive understanding of the current status and job market in the industry, enabling students to prepare in advance. This approach also plays a significant role in targeted talent development for companies. Actively promoting the "1+X" certification system can facilitate the reform of the education management system in higher vocational colleges, continuously improving aspects such as professional teaching, curriculum reform, and teaching models, thereby enhancing the level of student management and strengthening their service awareness.

4.4 Utilize Information-based Teaching Approaches Effectively

In recent years, with social development and advances in technology, students in the new era have undergone significant psychological changes compared to previous generations. Higher vocational colleges should adapt to this context by changing traditional teaching methods and adopting effective measures to innovate teaching approaches, keeping up with the times and leveraging the advantages of big data platforms. Information-based teaching not only provides abundant information but also transforms complex concepts into easily understandable forms, presenting them vividly to students. Therefore, teachers can make use of multimedia to teach various aspects of new energy vehicle-related technologies, visualizing abstract knowledge and appealing to students' senses, improving the teaching atmosphere, and stimulating student thinking. This helps students become more engaged in the classroom, taps into their potential, and cultivates their innovative abilities, thereby improving teaching

quality.

Information-based teaching differs from traditional textbook-based teaching. It is a new teaching approach that allows students to grasp new developments in the field of new energy vehicles more effectively, broaden their horizons, and ignite their thirst for knowledge. Additionally, some principles in new energy vehicles can be abstract, making it difficult for students to comprehend with traditional teaching methods without practical application. By using animations and video modes in information-based teaching, students can visually understand the working principles of new energy vehicles, aiding their deeper comprehension. For example, in the maintenance and upkeep of electric vehicles, relying solely on theoretical teaching can make it challenging for students to grasp the knowledge. Therefore, teachers can use online teaching modes to present key theoretical knowledge through animations, enabling students to observe related knowledge in a three-dimensional manner and enhancing their practical operational abilities.

4.5 Simultaneously Conduct Experiments and Practical Teaching

Vocational education places a strong emphasis on practical teaching to cultivate high-quality talents. In today's era, a perfect set of theoretical knowledge alone cannot support current development trends, especially in the field of new energy vehicles. After the implementation of the "1+X" certification system in the new energy vehicle maintenance module, teaching in higher vocational colleges should not be limited to imparting theoretical knowledge and skills. Attention should be given to cultivating students' vocational qualities, comprehensive abilities, and high professional ethics, thereby promoting their overall development. Society increasingly demands comprehensive technical talents who can apply theory to practice. Therefore, higher vocational colleges should focus on training students' practical skills and comprehensive abilities while enhancing theoretical knowledge. This fully engages students' learning enthusiasm, improves their comprehensive abilities, and prepares them for future employment.

Given that the new energy vehicle maintenance module covers both theoretical knowledge and practical skills, higher vocational colleges can provide more opportunities for students to participate in practical teaching. This not only promotes the development of students' comprehensive qualities and vocational skill levels but also allows students to acquire more professional knowledge and skills. Learning about the new energy vehicle maintenance module should not be limited to the campus. Schools should encourage and organize student visits and internships at renowned enterprises, allowing students to apply the knowledge gained from the "1+X" certification in practical projects. By integrating practical projects related to new energy vehicles into the curriculum, students can deepen their understanding of theoretical knowledge and gain practical knowledge that is difficult to obtain in the classroom. Schools can rely on cooperation with enterprises to provide various positions related to intelligent new energy vehicle assembly, inspection, and maintenance. Students can practice and apply the knowledge and concepts learned in labor education courses in real production scenarios, following enterprise safety production standards. Through modern apprenticeship programs, students can gain a clear vision for their future development, cultivating their problem analysis and solving abilities and ultimately enhancing the quality of their education.

4.6 Strengthen the Construction of the Teaching Team

To cultivate high-skilled and high-level successors in the new energy vehicle industry, higher vocational colleges require a skilled and extensive teaching team. In the construction of the teaching team, colleges can collaborate with 4S dealerships and new energy vehicle enterprises to jointly establish training models aligned with the "1+X" certification system. Enterprises can provide teaching resources from their own talent pool, signing contracts with colleges to train a certain number of talents over a few years. This approach not only ensures that colleges have highly professional teaching staff but also provides enterprises with qualified workers regularly. It effectively solves the employment issues for students and improves the employment rate of higher vocational colleges, benefiting all parties involved. Apart from seeking teaching resources from enterprises, colleges can also organize students and teachers to attend lectures conducted by enterprises. This allows students and teachers to gain a more comprehensive understanding of the new energy vehicle industry, stimulating students' enthusiasm for participating in the new energy vehicle industry and promoting teachers' in-depth study of new energy vehicle knowledge, thereby improving the teaching level of the school.

Higher vocational colleges should consider the development of teaching personnel for the new

energy vehicle maintenance module as an important part of the talent training program reform. Within higher vocational colleges, attention should be given to the construction of the teaching team, increasing the training of teachers and continuously enhancing their overall quality and teaching level. Colleges should provide teachers with more opportunities for research and learning, inviting experts from the industry and technical backbones from companies to improve the teaching capabilities of the teaching team. At the same time, it is crucial to strictly control the hidden outflow of teachers, ensuring continuous improvement in the quality of the teaching staff for the new energy vehicle specialty.

4.7 Optimize the Teaching and Examination Mode

The assessment of new energy vehicle technology courses in higher vocational colleges has traditionally focused on theoretical knowledge exams. While practical skill assessments have been emphasized in recent years, there is a lack of unified standards, resulting in inconsistent talent development quality. Higher vocational colleges should actively innovate the theoretical and practical assessment question banks and increase the weight of practical skill assessments in the total score. Practical skill assessments mainly evaluate students' hands-on abilities and practical skills. Higher vocational colleges can establish dedicated expert groups to assess students' understanding or familiarity with various aspects of new energy vehicle subsystems, functions, principles, and structural characteristics during practical assessments.

Higher vocational colleges should also actively align with national new energy vehicle skills competitions and adjust the internal assessment mode according to the requirements of vocational skill level certification. For example, theoretical assessments within the curriculum can be based on the requirements of the new energy vehicle skill exams, guiding students to acquire correct professional knowledge and emphasizing the cultivation of their practical abilities. Moreover, the assessment mode should also be innovated in terms of the assessment subjects. Taking advantage of industry associations, enterprises, and teachers, a comprehensive talent development system can be established, utilizing the advantages of various resources to create an objective and comprehensive evaluation system. For example, by incorporating enterprises into the teaching evaluation system, the quality of teaching can be precisely reflected through the comprehensive assessment of interns, prompting continuous improvement in teaching models and optimizing the talent training system.

5. Conclusion

The implementation of the "1+X" certification system has brought opportunities and challenges to the development of higher vocational colleges. Promoting the teaching reform of the new energy vehicle maintenance module under the "1+X" certification system is an inevitable trend for the current development of higher vocational colleges. When carrying out the teaching reform of the new energy vehicle maintenance module under the "1+X" certification system, higher vocational colleges should focus on the combination of theory and practice, fully empower students, continuously improve the assessment and evaluation system, make full use of advanced information technology, and promote better results in the teaching reform of the new energy vehicle maintenance module under the "1+X" certification system. This will provide high-quality talents for the development of China's new energy vehicle industry.

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