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Innovation and Practice of Talent Training Model for Automotive Service Engineering Technology from the Perspective of School-Enterprise Collaboration

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Abstract: Under the background of green, intelligent and connected transformation of China's automobile industry, newenergy vehicles are growing rapidly, while the traditional talent training mode dominated by mechanical engineering knowledge can hardly match industrial job demands, resulting in a prominent talent supplydemand mismatch. Schoolenterprise collaborative education serves as an effective solution to alleviate the talent bottleneck of the automotive industry. This paper adopts literature research, case study and questionnairebased survey research methods to sort out the theoretical foundation of schoolenterprise collaborative talent training, analyze multidimensional talent requirements of the automotive service engineering technology field, and identify practical dilemmas including insufficient cooperation depth, limited cooperation scope and imperfect institutional mechanisms. Typical schoolenterprise cooperation practices including Liaoning University of Technology, Tongji UniversitySAIC Volkswagen and a local higher vocational college cooperating with Yibin Kaiyi Automobile are analyzed. On this basis, four core elements covering clear training orientation, integrated curriculum system, diversified practical platforms and doublequalified teaching staff are constructed, together with three supporting guarantee mechanisms of policy institution, communication coordination and multisubject quality evaluation. The research conclusions can provide references for optimizing the talent training system for automotive service engineering technology and promoting the highquality development of the automotive industry via industryeducation integration.

Keywords: Schoolenterprise collaboration; Automotive service engineering technology; Talent training model; Industryeducation integration; OBE concept

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1. Introduction

1.1. Research background and significance

As a pillar industry of the national economy, the automotive industry is undergoing in-depth transformation

featuring greenization, intellectualization, and connectivity. From January to May 2025, the production and sales volumes of automobiles in China reached 12.826 million and 12.748 million units, respectively, with year-on-year growth rates of 12.7% and 10.9%. Among them, the sales volume of new energy vehicles (NEVs) accounted for as high as 44%. Technological iteration has spawned new positions such as battery management and autonomous driving. However, the traditional talent training model, which focuses on mechanical engineering knowledge, is seriously disconnected from industrial demands. According to the prediction of the Ministry of Industry and Information Technology, the talent gap in the NEV field will reach 1.03 million by 2025, and the mismatch between talent supply and demand has become a bottleneck restricting industrial development [1].

The school-enterprise collaborative training model provides an effective solution to this problem. When enterprises participate in the teaching process, they can integrate cutting-edge technologies such as 800V battery pack disassembly and vehicle-road collaboration into classrooms, shortening the employment adaptation period for students [2]. Universities, on the other hand, can eliminate "low-quality courses" by leveraging enterprise resources, promote project-based learning, and establish a diversified evaluation system. This integration not only meets the talent needs of enterprises but also promotes the transformation of higher education towards application-oriented development, thus possessing significant practical significance for the sustainable development of the automotive industry.

1.2. Research objectives and methods

This study aims to analyze the current situation of school-enterprise collaborative training, extract successful experiences from typical cases, and construct an innovative and operable talent training model for automotive service engineering technology, thereby alleviating the talent contradiction in the industry [3].

A combination of multiple research methods is adopted: the literature research method is used to sort out the theoretical achievements of school-enterprise collaborative talent cultivation; the case study method focuses on typical cooperation projects such as those of Liaoning University of Technology and Tongji University to explore the operation mechanism and effects; the survey research method collects first-hand data including the current teaching situation in universities, enterprise demand standards, and students' learning experience through questionnaires and interviews, ensuring the authenticity of the research conclusions.

2. Core value and practical dilemmas of school-enterprise collaborative training

2.1. Multi-dimensional talent demands of the automotive industry

Industrial transformation has rendered the demand for automotive service engineering technology talents to be characterized by comprehensiveness. In terms of technical capabilities, talents need to master core skills such as the principles of the three-electric system (battery, motor, electronic control) of NEVs and intelligent sensor data processing, such as the maintenance of Tesla's battery management system and the application of Waymo's autonomous driving perception technology. In terms of innovation capabilities, they should be able to keenly capture technological trends and propose solutions, similar to the research and development of BYD's blade battery. In terms of interdisciplinary capabilities, they are required to integrate knowledge of mechanics, electronics, and computer science to support the design and operation of complex systems such as intelligent cockpits [4].

2.2. Unique advantages of school-enterprise collaboration

School-enterprise collaboration achieves complementary resource advantages and win-win results:

universities consolidate students' theoretical foundation by virtue of advanced laboratories and academic resources, while enterprises provide practical scenarios through production workshops and real projects [5]. In the "Intelligent Manufacturing Blue-Collar" special class jointly launched by Jiangsu Shipping College and CIMC Group, students participated in container intelligent manufacturing projects and quickly grew into technical backbones after graduation. The research achievements in battery materials of Wuhan University of Technology have provided technical support for the upgrading of Dongfeng Motor's NEV models, demonstrating the dual value of industry-university-research integration.

2.3. Main problems of the current training model

Despite the progress made in school-enterprise collaboration, there are still three major bottlenecks: insufficient depth of cooperation. Most collaborations only stay at short-term visits and internships, and enterprises do not participate in curriculum design and evaluation. For example, the hands-on operation time of students majoring in automotive engineering in an off-campus internship at a certain university accounts for less than 30%. Limited scope of cooperation. Small and medium-sized enterprises and local universities have low participation, and there are gaps in cooperation in fields such as after-sales service and automotive finance. Lagging mechanism construction. The lack of effective communication and coordination mechanisms, and unreasonable benefit distribution have led to low enthusiasm of enterprises to participate. Some enterprises are reluctant to invest core resources due to concerns about talent loss.

3. Innovative practice cases of school-enterprise collaborative training

3.1. Liaoning University of Technology: Precision talent cultivation based on OBE concept

Facing the severe employment situation in 2025, the major of Automotive Service Engineering at Liaoning University of Technology has reconstructed its training system based on the Outcome-Based Education (OBE) concept. The employment rate of its graduates has exceeded 80%, and graduates are highly sought after by enterprises such as Zhejiang Leapmotor. Its core measures include three aspects:

Firstly, reverse design of the training program. The major is divided into two directions: "production and manufacturing services" and "aftermarket services". Enterprise experts are invited to participate in curriculum planning, and enterprise-customized courses such as IATF Quality Standards and PMP Project Management are added to achieve seamless connection between curriculum content and job requirements. According to Gao Xu, a student, the knowledge learned in the PMP course enabled him to quickly get started with projects during his internship and gain high recognition from the enterprise [6].

Secondly, the construction of a practical education system. An intelligent laboratory cluster is built, equipped with vehicle-mounted electronic development equipment synchronized with that of enterprises. Internship bases are jointly established with enterprises such as Jinzhou Halla and Zhejiang Leapmotor, and a linkage mechanism of "internship-competition-project" is established [7]. Ren Hongli, a student, received high praise from Tianjin Longchuang during her internship due to her outstanding professional capabilities, demonstrating the effectiveness of practical training.

Thirdly, the development of a "double-qualified" faculty team. Over 83% of the teachers have enterprise work experience. For example, Teacher Zhang Wei, who has in-depth experience in the entire process of automotive component design, integrates real cases into project-based teaching. The teacher team provides

personalized guidance such as resume optimization and mock interviews from the first year of university, comprehensively enhancing students' employability.

3.2. Tongji University and SAIC Volkswagen: "Pre-Engineer" joint training

As a classic case of school-enterprise cooperation, the two parties have jointly established a National Engineering Practice and Education Center and implemented the "Excellent Automotive Pre-Engineer Program". Senior undergraduates (fourth-year students) establish their understanding through enterprise visits, while postgraduates take actual enterprise projects as the direction of their graduation theses. Every year, 20-30 undergraduates are selected to work in enterprise departments and receive joint guidance from school and enterprise tutors on projects.

Xu Liming, a graduate of the 2009 class, took "Design and Test of Plastic Fuel Tanks" as his research topic. Under the guidance of enterprise tutor Dai Qisong and school tutor Deng Jun, he completed the research results within 4 months, which were applied to actual production. His thesis won the Volkswagen Excellent Thesis Award, and he successfully stayed in the enterprise. This model has been extended to independent brands such as SAIC and Geely, and joint training programs for studying in Germany have been carried out with foreign enterprises such as Audi and BMW, forming a talent training consortium.

3.3. A certain college and Yibin Kaiyi Automobile: Skill training and in-depth integration

The two parties jointly carried out CATIA skill training. Kaiyi Automobile selected senior engineers to form a teaching team, providing practical training for more than 60 automotive majors. The training covered core modules such as sketch design and generative surfaces, and strengthened application capabilities by combining enterprise R&D cases. After the training, students' engineering practice capabilities have been significantly improved, laying a solid foundation for their careers in automotive design.

Based on the achievements of the training, the two parties plan to expand cooperation further: jointly formulate training programs, develop characteristic courses, build training bases, and conduct joint research on scientific research projects, forming a virtuous cycle of "technology input-talent output-scientific research feedback" to support Sichuan's construction as a strong automotive industry province.

4. Key elements and guarantee mechanisms of school-enterprise collaborative training model

4.1. Four key elements

Clear training orientation is the prerequisite. Similar to Liaoning University of Technology, it is necessary to align with the job requirements of enterprises such as Tesla and BYD, and set the training goal as cultivating "compound talents mastering new energy and intelligent connectivity technologies" to serve the development of regional industries [8].

An integrated curriculum system is the core. It is necessary to break disciplinary barriers and build a curriculum system consisting of "basic courses + cutting-edge courses + enterprise courses". Standards such as Tesla Technician Certification should be introduced, and real projects such as battery thermal management and intelligent connectivity testing should be modularly integrated into teaching.

A diversified practical platform provides support. Through joint construction of internship bases, project practice, and participation in intelligent vehicle competitions, students can improve their capabilities in

solving practical problems. For example, the project of "improving the endurance of new energy vehicles" has effectively exercised students' teamwork and innovation capabilities.

A "double-qualified" faculty team is the guarantee. A system for teachers to practice in enterprises should be established, requiring them to participate in enterprise R&D for a total of no less than 6 months every 2 years. Enterprise backbones should be hired as part-time tutors to form a faculty structure of "engineer-teachers and teacher-engineers".

4.2. Three guarantee mechanisms

Policy and institutional guarantees are the foundation. The government needs to learn from Germany's "dual-system" experience, clarify enterprise responsibilities through legislation, and provide tax incentives [9]. Universities and enterprises should sign agreements to clarify rights and responsibilities in talent training and benefit distribution, and establish a teaching quality supervision system.

A communication and coordination mechanism is the key. Regular joint meetings should be held to discuss cooperation issues, a special office should be set up to be responsible for daily coordination, and an information platform should be built to realize resource sharing, ensuring that enterprise needs and teaching arrangements are synchronized in real time.

A quality evaluation system is the support. A multi-subject evaluation system involving universities, enterprises, and industries should be built. The proportion of enterprise internship performance in the total evaluation should be increased to 40%, and multi-dimensional evaluation should be conducted from theoretical knowledge, practical ability, and professional quality. The training program should be dynamically adjusted based on feedback [10].

5. Conclusions and prospects

5.1. Conclusions

This study shows that school-enterprise collaboration is an effective way to solve the contradiction between supply and demand of automotive service engineering technology talents. The shortcomings of the traditional training model in curriculum, practice, and faculty can be addressed through in-depth enterprise participation. Cases such as Liaoning University of Technology's OBE-based precision training and Tongji University's "Pre-Engineer" program prove that clarifying training orientation, building an integrated curriculum, creating a practical platform, developing a "double-qualified" faculty team, and combining policy guarantee, communication and coordination, and quality evaluation mechanisms can significantly improve the quality of talent training.

5.2. Future prospects

In the future, school-enterprise collaboration needs to develop to a deeper level. In terms of cooperation models, industrial colleges and joint R&D centers should be co-established to realize the full-chain integration from talent training to technological innovation. In terms of talent training, curriculum content should be continuously updated, cross-cultural communication capabilities should be strengthened, and talents with an international perspective should be cultivated. In terms of guarantee mechanisms, it is expected that the government will increase special support, establish a mechanism for benefit sharing and risk co-sharing between schools and enterprises, and promote the normalization and long-term effectiveness of cooperation, so as to provide solid talent support for the high-quality development of the automotive industry.

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References

[1] Xu J P, Fang J, 2013, Study on Talent Cultivation Mode for Vocational Education Teachers of "School-Enterprise-School Integration, Teaching-Working-Learning Combination"—The Case of Automation Specialty of Jilin Teachers' College of Engineering and Technology, Vocational and Technical Education, 34(5): 67–70.

[2] Wei H, Yan J, Zhou H, et al., 2010, Construction of Practical Teaching System for Automotive Service Engineering Major Based on Project Teaching. Vocational Education Forum, 26(18): 67–70.

[3] Rao B, Liu Y, Lu Z, et al., 2018, Construction of Multi-Disciplinary Interdisciplinary Talent Training Model for Urban and Rural Construction under the Concept of New Engineering. Journal of Yunnan Agricultural University, 12(3): 161.

[4] Yang Y, Xu S, 2009, Research on Operation Mechanism and Management System of School-Enterprise Joint Construction Training Base—Taking Applied Electronics Major of Higher Vocational Colleges as an Example. Guangxi Light Industry, 25(10): 172–172.

[5] Yuan Z, 2023, Countermeasures for Cultivating Innovative and Entrepreneurial Abilities of Students Majoring in Automotive Service Engineering. Automotive Test Report, (18): 140–142.

[6] Xu T, 2025, Innovation of Talent Training Model for Automotive Repair Major in Vocational Colleges under the Integration of Industry and Education. Automotive Knowledge, 25(2): 199–201.

[7] Jin Z, 2023, Practice and Research on the Training Model of Industry-Education Integration Talents under the Background of "1+X Certificate System"—Taking the Middle-Career Auto Repair Major as an Example. Auto Time, (10): 67–69.

[8] Rauner F, 2011, Dual-System Vocational Education—The Driving Force for Improving Germany's Economic Competitiveness. Vocational and Technical Education, 32(12): 68–71.

[9] Bao Y, Wang G, Wang W, 2020, Research on the Cultivation Path of Innovative and Entrepreneurial Abilities of Students Majoring in Automotive Service Engineering. Economic Research Guide, (09): 182 + 188.

[10] Ning X, Yao J, Wang Y, et al., 2015, Research on the Construction of Talent Training Model for Automotive Service Engineering Major. Journal of Henan Institute of Science and Technology, (6): 30–32.

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