

## Reform and Practice of Localization and Integration of Automobile Structure Course

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### Abstract

**In order to meet the needs of the developing society and give full play to the central role of the higher vocational colleges in service regional economy, the reform and practice of the integration course of automobile structure localization have been carried out by optimizing the existing curriculum training scheme and introducing enterprise products and cases. The results show that this reform has effectively improved the students' knowledge and recognition of the enterprise, guided the students to stay in the local employment to a great extent, accumulated some experience in training for the local employment, and provided some reference value for the localization of vocational education in China.**

### Keywords

**Higher vocational school, Local integration, Localized employment, Industry-education integration.**

### 1. Introduction

With the rapid development of China's economy, the adjustment of industrial structure and the transformation and upgrading of development mode, the demand for high-quality technical and skilled personnel is increasing day by day. The practical experience of the reform and development of higher vocational education shows that we must follow the basic idea of opening up schools and follow the road of cooperation between schools and enterprises and the integration of industry and education [1,2]. The 2019 Wenzhou municipal government work report points out that in 2018, the local government has paid more and more attention to the local employment rate of local college graduates. Vocational and regional higher vocational education requires it to take the initiative to serve the development of regional economy, and provide talent guarantee and intellectual support for the development of regional economy, thus becoming an important booster for the development of regional economy [3]. How to retain and activate local talents and bring in foreign talents is an important direction for the reform of professional courses in colleges and universities.

Teachers of higher education in China have made a lot of efforts in the reform and optimization of automobile structure course. The general automobile is a complex whole system composed of tens of thousands of parts and components, and the working principles of its components involve a wide range of disciplines, relatively complex operating principles, various structural forms and variety of parts and vehicles. At the same time, students have no practical production experience in contact with the course, and lack of basic perceptual understanding of the actual mechanical structure. In terms of talent training system and teaching theory innovation, teachers such as Cheng Feng of Zhejiang University of Science and Technology studied the training system of applied talents for vehicle engineering specialty in 2010. The results show that the modularization of experimental teaching improves the teaching effect obviously [4]. Xu Bin of Henan University of Science and Technology and others have explored the reform of the

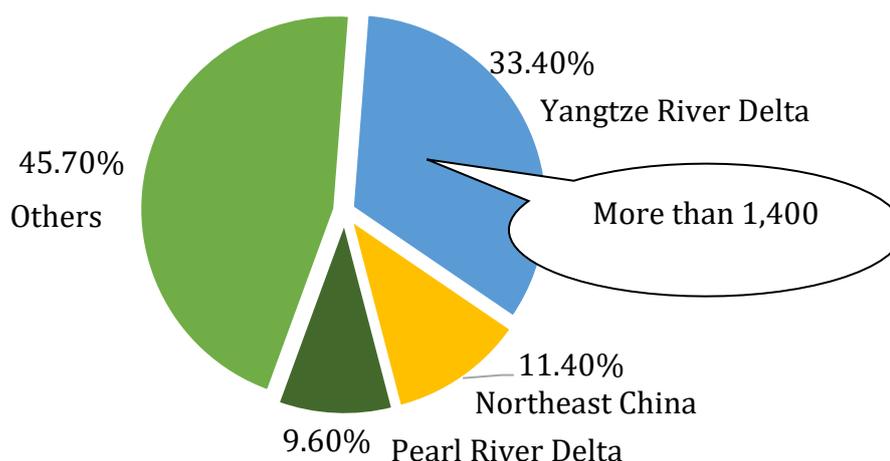
integrated teaching mode of vehicle engineering specialty based on college students'equation automobile competition to provide a new mode for automobile specialty teaching [5]. Yao Lihong of Beijing Forestry University put forward that the establishment of the curriculum system of vehicle engineering under the development of market economy in the new era should take into account the simultaneous improvement of students'theory, practical ability and innovation ability [6]. Shi Shaoning of Shaanxi University of Technology and Fu Jun of Shaoyang College have both proposed that the characteristic teaching of vehicle engineering courses should focus on the combination of theory and practice [7,8].

Teachers have carried out multi-level and multi-level teaching reform on automobile structure course from theory and practice, but under the new situation of strengthening local employment orientation and ideological and political education, new problems need to be dealt with are emerging. The main problems are the decrease of course hours, the lag of teaching aids renewal, the rapid development and change of enterprises, the increasing technical requirements of industry skills and so on. In order to solve these difficult problems, this paper will carry on the localization fusion reform to the automobile structure teaching in practice, selects the products or the enterprise development story of each leading enterprise in the auto-friction industry in wenzhou area, and integrates into the teaching case, carries on the resources integration with the actual teaching, improves the teaching effect. In order to solve these problems, this paper will select the products or enterprise development stories of the leading enterprises in the automobile industry in wenzhou area to integrate into the teaching case, and apply them to the actual teaching, and carry out the local integration reform and practice of the teaching of automobile structure to improve the teaching effect.

## 2. Basis of Teaching Reform

### 2.1. Regional Development

The share of China's auto parts production varies from region to region. There are more than 1,400 auto parts manufacturers in the Rui'an area of Wenzhou, see Fig. 1.



**Fig 1.** The share of China's auto parts production in different regions

According to the data released by China Automobile Industry Association, in June 2019, China's automobile production and sales volume respectively completed 1.895 million and 2.056 million, an increase of 2.5% and 7.5% month on month, down 17.3% and 9.6% year on year. Among them, the growth rate of passenger vehicle production and sales is higher than that of the whole industry. In terms of accumulation, China's automobile production and sales volume

in January June 2019 were 12.132 million and 12.323 million respectively, with the production and sales volume down 13.7% and 12.4% respectively compared with the same period of last year. The output decline increased by 0.7 percentage points compared with that in January may 2019, and the sales volume decreased by 0.6 percentage points, which means that more and more graduates will face more fierce employment competition, and the opportunity to enter high-quality enterprises will be greatly reduced.

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The auto parts industry in Wenzhou is dominated by parts production, supplemented by vehicle production, and the application degree of intelligent manufacturing in the industry is increasing year by year. Most of these enterprises have long-term communication with our college and absorbed students into the enterprise employment, and give excellent evaluation of our graduates. For example, in the Ruian base of Ruili Group, there are nearly 80 graduates from Wenzhou Polytechnic who have worked in it over the years. Some of them have been promoted to core management positions and won the excellent evaluation of the enterprise. Therefore, it is an important path and method for us to serve the local industry industry to do a good job in the curriculum reform and optimization, and to cultivate professional technical skills and professional quality of professional students.

## 2.2. Employment Orientation

Although many colleges try their best to do a good job in higher vocational education, there are many professional settings that do not meet the actual needs of the society in the specific work, which results in the lack of practical ability of students in the actual practice, so that students create many problems in the channel of employment information. In order to change this situation, colleges should emphasize employment orientation, and put the idea of running a school on going to the market, respond to the changes of market demand in time, pay attention to the cultivation of students' employability and entrepreneurial ability as the theme, highlight the distinctive application characteristics of the school, enhance the recognition of the society, so as to promote the growth of employment rate.

Wenzhou Polytechnic, as a provincial key vocational school, attaches great importance to the cultivation of students' professional skills. Relying on the support of the Rui'an Municipal People's Government, Rui'an College gives full play to the advantages of combining industry resources with industry resources of higher vocational education and close contact and co-education of students' family, so as to serve the development of the Rui'an regional industry, and to set up the specialties to meet the needs of social and economic development[9]. The course of automobile structure is an important course for the students of mechanical major in our college to be engaged in product design and development, production process arrangement, high skill operation, equipment operation management and equipment maintenance in the future. Based on the poor source of students, lack of teachers, old training equipment, do a good job of automobile structure course teaching, make our students' professional technical skills and enterprise reality more corresponding, is an important subject in front of us.

In order to serve the local industry, it's important for us to do a good job of curriculum reform and optimization, and to cultivate students' professional skills and professional literacy.

### 2.3. Human Resource Planning

Human resource planning is to scientifically predict the supply and demand of human resources in the future environment change of the organization according to the strategic goal of human resources of the enterprise, to formulate the necessary strategies of human resource acquisition, utilization and development, to ensure the demand of the organization for human resources in quantity and quality, and to ensure the long-term interests of the enterprise and the individual. Human resource planning is a procedure to ensure that enterprises can obtain appropriate and applicable personnel in time, so that human resources can be used economically and effectively [10].

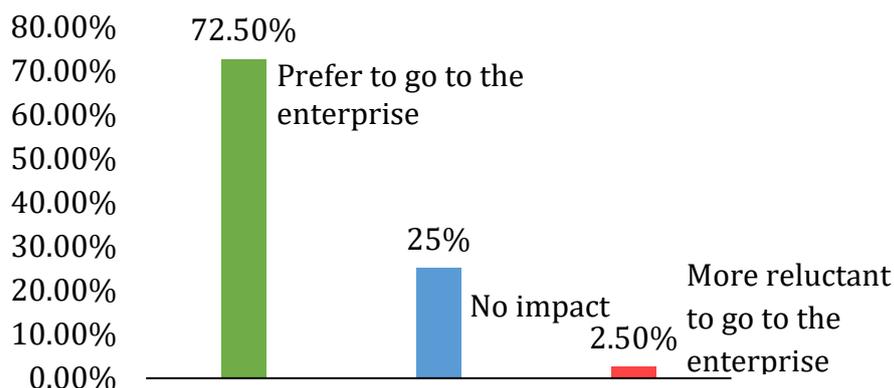
With the rapid development of regional economy, the continuous adjustment of industrial structure, the transformation and upgrading of development mode, the local enterprises in the process of transformation, the demand for employees gradually changed from the early immediate use to the current use of good, can be retained. Most of the enterprises have their own human resource planning, and have a strong desire to train reserve talents together with higher vocational colleges to realize the localization of enterprise talents. For example, the Ruili Group plans to make strategic reserves of human resources. It is expected that in the next few years, it will need more than 500 mechanical and electrical integration and mechanical manufacturing technicians. It plans to cultivate and supplement a group of technicians with good comprehensive quality and high skills in the front line to match the group's innovation and development during the 13th Five Year Plan period and in the future. That means most of the enterprise enthusiastically participates in the enterprise product enters the classroom teaching project, this also has laid the good foundation for the curriculum teaching reform.

## 3. Implementation of Teaching Reform

### 3.1. Curriculum Objectives

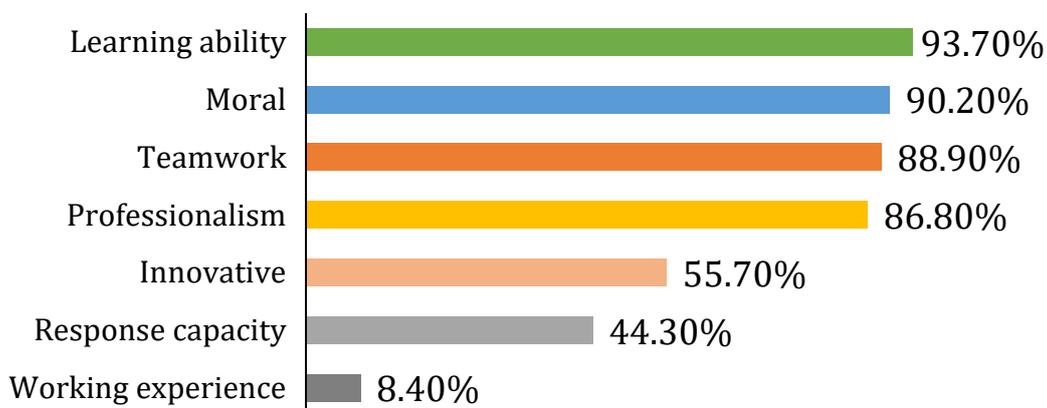
Students are the main body of learning, teachers play a leading role in teaching, and the common activity place of teachers and students is classroom. The best teaching method is to guide students to use the learning strategies summed up by teachers in the classroom to complete the learning tasks and achieve the learning goals alone or in cooperation. The characteristics of automobile structure course are many theoretical knowledge and wide coverage. If teachers explain the theoretical knowledge blindly, it takes time and effort, and get half the results with double the effort. Therefore, the introduction of peripheral enterprise products directly, help students to seize the opportunity when competing with other students. In the beginning of the course, a questionnaire survey was conducted on the integration of the teaching content of enterprise products, see Fig. 2.

The results show that most of the students are more willing to choose an enterprises which they have got a certain knowledge. By introducing the enterprise products into the teaching course, on the one hand, it can enrich the practical teaching content of the course, make the teaching process more substantial, on the other hand, it can enhance the students' understanding and recognition of the surrounding enterprises, and have a knowledge of the culture and products of these enterprises before graduation, and greatly enhance the students' willingness to enter the relevant enterprises after graduation. Based on the fact that students are not good at theoretical analysis and calculation, and prefer to do hands-on practice, the actual teaching content and teaching goal of automobile structure course need to be closely combined with employment orientation, and introduce and expand the products of regional enterprises.



**Fig. 2** Knowledge of the enterprise affects students' employment choices

At the same time, in the early stage of the course programming, it is necessary to analyze the development status of the regional industry and the demand for employment. Therefore, a survey on the employment needs of the surrounding business owners or human resource managers was conducted, see Fig. 3. The results show that most human resource managers value the learning ability, moral quality and team consciousness of the graduates most, and the moral quality is mainly reflected in loyalty and intellectual property protection.



**Fig 3.** Top 3 features of fresh graduates that HR focus on

### 3.2. Curriculum Programme

In the process of curriculum development, based on the teaching content, find suitable enterprises to do research, and conduct in-depth research of important enterprises in the form of projects or practices. The contents of the training program of automobile structure course should be closely combined with local enterprises, and the performance, characteristics and relevant basic knowledge of enterprise products should be integrated into each module of the course in the form of cases.

The enterprise content introduction course training scheme is shown in Table 1.

**Table 1** Curriculum training programme

Module	Enterprise	Product	Chapter
Engine	Ruiming Group	cylinder	Engine body
	Universe Filter	air filter	Fuel system
	Ruixing Carburetor	carburetor	Fuel system
Chassis	Ruili Group	brake	Braking system
	Xunda Auto	transmission shaft	Transmission system
	Gold Shock Absorber	absorber	Drive system
	YuXi Steering Gear	steering gear	Steering system
Vehicle body	Weltmeister Auto	vehicle body	Vehicle body manufacturing
Auto electric	Changjiang Automobile Electronic	dashboard	Auto electric
	Sheng Huabo Auto Appliances	Wiper	Auto electric

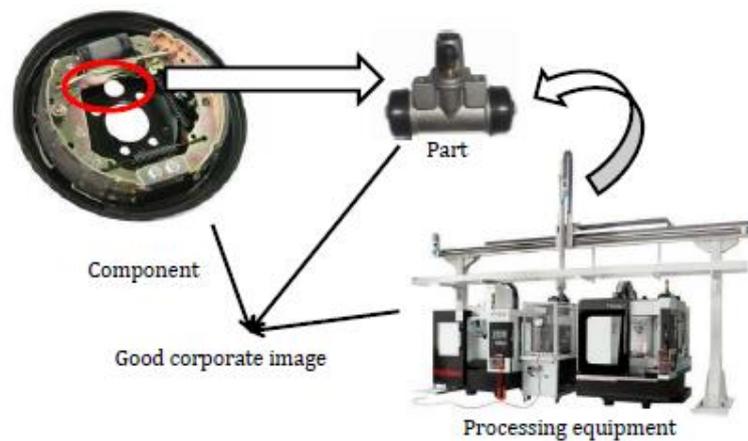
With the introduction of real products and cases of related enterprises, the original boring theoretical knowledge becomes more vivid. Because of the case of surrounding enterprises, many students can find a common language in the classroom, and actively participate in the discussion and speech, and show strong interest in these enterprises and products, greatly improve the classroom teaching ecology, improve students' participation in the classroom, which provide a guarantee for better completion of the learning tasks of each module.

### 3.3. Curriculum Implementation

When introducing the theoretical knowledge, the teacher uses multimedia and animation demonstration, and then leads the students to the workshop site for the actual disassembly operation. The teacher arranges tasks and groups, issues task work orders, and leads the students to study the actual products. In the process of on-site guidance, teachers can guide the group students in a centralized way, or give detailed guidance for the problems of individual students, so as to ensure that all students can master relevant knowledge and improve their practical skills. In the process of explaining the basic structure and working principle of automobile, students can understand the complex working principle and process more clearly by introducing the real products of enterprises, combining with animation, video and real objects, etc. At the same time, students can be familiar with enterprises and their products, so as to reduce the cost for students to obtain enterprise information search. In the process of localization and integration of teaching, what teachers should do is to make full use of the relevant physical and digital resources of enterprises, use as rich teaching materials as possible to mobilize the enthusiasm of students' learning, create a good learning environment for students, enable students to understand local enterprises in the process of learning boring theoretical knowledge, shorten the distance between the knowledge in books and students, and improve the teaching effect, promoting local employment orientation.

Take the Ruili Group as an example, in the course of teaching automobile braking system, combined with the real product of the Ruili Group, drum brake, the specific structure and function of the product are introduced, and the real product is disassembled and assembled in groups. At the same time, focus on the basic structure and production and processing methods of the brake cylinder, which is the core production part of Ruili. Combined with its truss manipulator processing equipment, highlight the core production capacity and innovative

development of the enterprise, and try to forming a good product awareness and corporate image in the minds of students, see Fig.4.



**Fig. 4** Logic of course curriculum reform

Through this form of product teaching and manufacturing process analysis, students can intuitively understand the real structure of automobile and the products of surrounding enterprises, and form a good impression on the current situation of industry development and manufacturing in China. This kind of teaching mode also encourage students to spend more time on learning and devote themselves to industry construction and serve the national development.

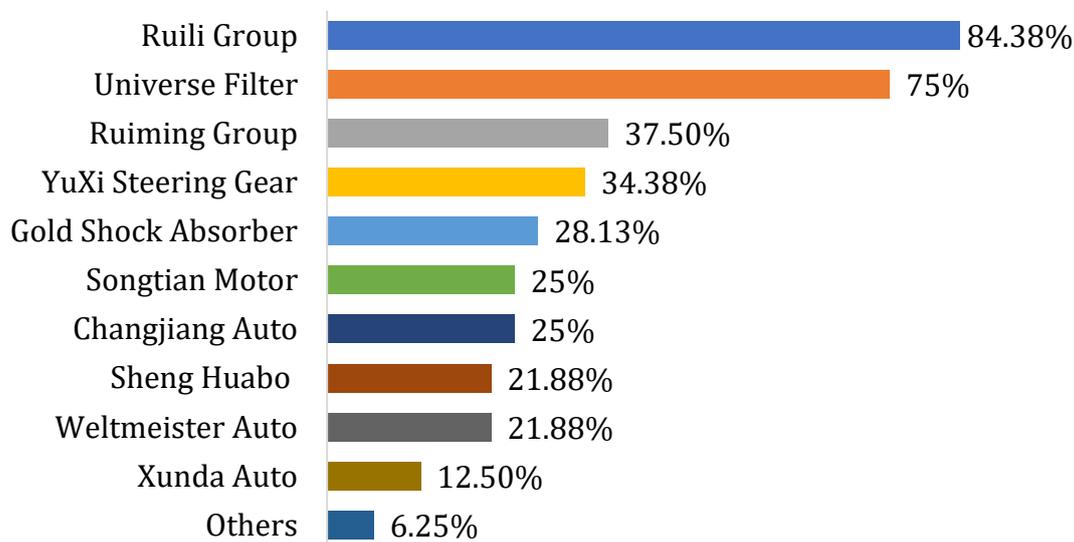
#### 4. Teaching Effectiveness

Based on the teaching method reform of localization and integration of automobile structure course, local content is fully integrated in the teaching process. The boring theoretical teaching content is combined with vivid local enterprise products to actively guide students to master relevant professional knowledge and practical skills.

On the one hand, in the course of using real products from local enterprise, students should form a group according to the way of team work, they need to fully tap their potential: the ability of independent learning, the ability of analyzing and solving problems, the ability of hands-on and so on. In this process, students naturally integrate the previous learned theoretical knowledge and get familiar with the industry in this region, get familiar with the real products of enterprises. On the other hand, this reform can also push teachers to do further reflect on the significance and value of the concepts and theories that we have taught over and over again. And through the real project teaching process, enrich their own practical experience, and constantly study between theory and practice, can more deeply experience the professional pleasure of teaching and learning. As a practical major, theoretical education often lags behind the industry, and it is one of the important missions of courses to promote practice to the theoretical level and give back to the society. Only by keeping close relationship with the industry, our scientific research and theoretical exploration will not be divorced from the reality of the industry and market. And such cooperation also promotes the contact between teachers and enterprises, and provides a basis for the development of related scientific research projects.

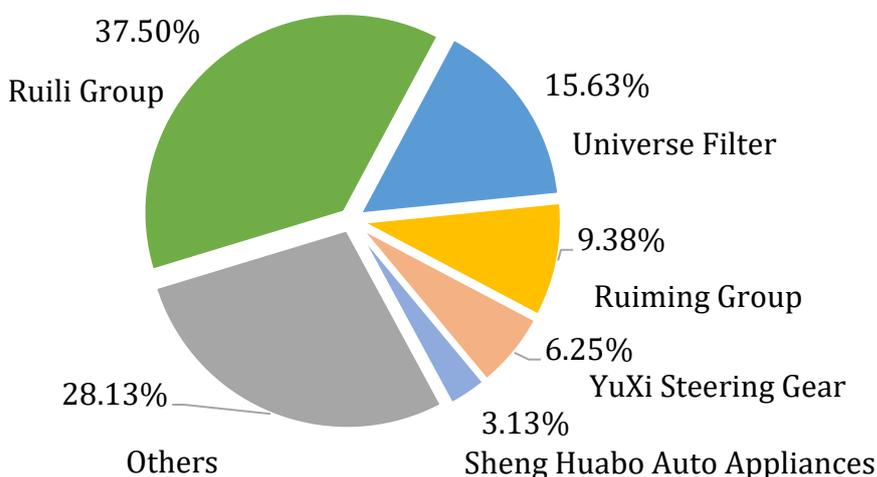
After a semester of teaching, more than 80% of the students think that the teaching schedule is reasonable and the content is easy to accept. The assessment results show that the teaching effect is better than the original teaching mode. At the same time, all the students said that the

localization integration course has positive guidance for their stay in local employment. They have considered working in the automobile industry in the region, and their awareness of the Ruili Group, the Universe Filter and the Ruiming Group rank the top three, see Fig 5.



**Fig. 5** Enterprises that impress students in the course

At the end of the course, students are invited to send resumes to a local enterprise. 37.5% of students choose to send resumes to Ruili Group, 15.63% choose to send resumes to Universe Filter, 9.38% choose to send resumes to Sheng Huabo Auto Appliances, and more than 70% choose to send resumes to relevant enterprises mentioned in the class, See Fig 6.



**Fig 6.** The first choice to sending resume of the students after class

Nearly 10 students have sent resumes to the enterprises mentioned in the course, and obtained interviews from the human resources department of the enterprise and successfully obtained internship opportunities. At the same time, almost all of the students said that if they have the opportunity, they are willing to enter the relevant local enterprises for practice, which is a very positive signal for the school's local employment orientation, and also provides a good model for the relevant curriculum reform.

## 5. Conclusion

In the rapid development of society, students' understanding of the enterprise is an important guarantee for them to rush out of the fierce social competition and enter the high-quality enterprise. The localization and integration teaching reform of automobile structure course complies with the development requirements of modern education, and is an effective way to cultivate students' ability to meet the real needs of the enterprise. By using appropriate products of surrounding enterprises to prepare teaching cases and dismantle real auto parts, students can firmly grasp relevant professional knowledge in the learning process, have a certain understanding of relevant enterprises and generate special emotions, and lay a certain foundation for the subsequent selection of relevant enterprises.

Teaching practice has proved that, the reform can improve students' interest in learning the course, improve teaching effect, and it can also help students get familiar with the industry in this region, get familiar with the real products of enterprises. By disassembling and assembling the real products which made in China and design by Wenzhou, students' sense of industry and local belonging has been improved, and their industry confidence and national confidence have been gradually formed, which can effectively make reserves for talent supply of auto industry in the region.

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