A Study on The Experience and Effect of The Construction of Professional Teaching Resource Bank in Vocational Education-- A Case Study of Automobile Intelligent Technology

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Abstract. This paper mainly takes automobile intelligent technology as an example to introduce the experience and effect of professional teaching resource pool construction in Vocational education. By means of integrated design, advanced technology support, open management, network operation and continuous updating, the project systematically builds a "progressive ability" course system, develops high-quality teaching resources, realizes the functions of "energy learning and supplementary education", explores the certification, accumulation and transformation of learning results, reforms the professional teaching mode, improves the quality of professional training and social service ability, and drives the National Teaching Reform of automotive intelligent technology specialty. Finally, it summarizes the problems of the construction of vocational education resource pool, puts forward corresponding strategies, and hopes to provide scientific guidance and help in the teaching resource pool of Vocational education.

Keywords: vocational education;teaching resource; progressive ability; teaching Reform.

1 Thoughts on resource library construction

The construction of this project closely surrounds the development of automotive smart industry, fully combines the effectiveness, prospectiveness, operability and effectiveness[1-3], makes a scientific plan for the overall design, co-construction and sharing of high-quality resources[4], promotes the reform of "three education". It serves teachers, students, employees of enterprises and social learners. The specific ideas for the construction are as follows:

1.1 Overview of resource pool project construction covers the whole industry chain to meet the needs of industry development

Automotive intelligent technology is the integration of automotive technology, electronic technology, information technology, communication technology, artificial intelligence technology and automatic control technology. It has a long industry chain, wide technical field and fast development. Therefore, the teaching resource pool of automotive intelligent technology specialty must have a scientific logical structure, covering all fields and links of the industry chain, in order to meet the needs of the same specialty in different colleges and

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universities and different specialties in the same kind of colleges[5]. This project builds standardized and characteristic courses and carries out teaching, training and continuing education according to the logic of "material-integrable ware-module-course" according to the needs of each link of the industry chain. In order to meet the needs of industrial development, four information windows, including professional parks, technical services, innovation and entrepreneurship, and 1+X certification, are set up to obtain new technology and information, so as to provide guarantee for the continuous updating of resource content.

1.2 Deconstructing Tasks to Promote the Sustainable Development of Resource Pool

Relying on the National Federation of New Energy and Intelligent Network Automotive Commission and Automotive Intelligent Technology Resources to build and share, dock with the representative enterprises in the industrial chain, research automotive intelligent product assistant R&D, trial production, smart automotive system application development, smart network automotive assembly debugging, after-sales service and other typical positions, according to the idea of "deconstruction work, restructuring learning", the "deconstruction" task, To get the knowledge and skills needed to complete the work tasks, draw "Map of Knowledge and Skills", "Construction According to Graph" to develop various types of materials, such as graphics, video, animation, VR/AR, to meet the integrity of the single structure, and to ensure any open reorganization in different, loose teaching environments and contents[6]. At the same time, it further optimizes the management mechanism, pays attention to the user experience, explores the authentication and mutual recognition mechanisms, continuously improves the quality of resources and services, and gives full play to the maximum efficiency of the resource pool. Strengthen performance evaluation, promote co-construction and sharing, dynamic update, and promote the sustainable development of the resource pool.

1.3 Rebuild Learning Tasks and Build Structured Courses

Different teachers, students, enterprise users and social learners can customize "O20 mix", "flip classes", "collaboration and mutual assistance", "virtual-real combination" and other diverse learning programs, "restructure" learning tasks, select knowledge points and skills points from "knowledge and skills map" point, bring into play flexible platform reference resources, build and restructure functions such as integrators, modules, courses, and so on, "select resources and materials according to the diagram". Construct "Standardized Course" or "Personalized Course" to realize personalized learning and personalized teaching [7-8].

2 Analysis of construction effect

Guided by the needs of the industry and enterprises, based on teaching and curriculum reform, and based on professional teaching standards, this project strengthens the characteristics of vocational education, integrates innovation and entrepreneurship education, highlights the characteristics of "teaching" and "learning" on the Internet, and comprehensively builds a hybrid learning platform with rich resources, complete functions, reliable quality, and distinctive features.

2.1 The resource planning is reasonable, realizing "redundant quantity, rich types and diverse forms"

A. Meet professional standards and serve user needs

From the perspective of "Internet plus vocational education", the project has developed 14864 pieces of materials, including 5171 pictures and texts, 9693 non pictures and texts, and 19684 exercises, centering on user experience, paying attention to user needs, focusing on professional talent training programs, curriculum standards, teaching standards and technical standards, and focusing on learning knowledge points and skills that users should master. Focusing on the aggregation and coordination of knowledge and skills teaching resources, we have included relevant enterprise cases and innovation and entrepreneurship materials into the teaching resource system. The learning center has built 18 personalized courses, 1375 sets of test papers, 6 training courses for training center construction, 2 innovation courses, 41 skill training modules or typical tasks for skill center construction, 300 enterprise cases, and dynamic links between education resource elements, On this basis, a scientific and reasonable resource system has been formed.

B. Connect with the 1+X certificate system and integrate professional skills

With the goal of "docking the specialty setting with the industrial demand, the curriculum content with the professional standard, and the teaching process with the production process", we implemented the "dual" collaborative education mode of school enterprise cooperation, actively served the 1+X certificate system, incorporated the training content and assessment standards of vocational skill grade certificates into the content construction of the resource library, realized the organic connection between the X certificate and the curriculum, and built a modular curriculum system of "course certificate integration", The structure of modular courses has been optimized, and a systematic teaching resource has been developed, which is based on the integration of job orientation, work process orientation and "teaching and doing". The resource library has become a service platform to support multiple types of vocational skill certificates and a learning achievement certification center, helping students improve their vocational skill competitiveness.

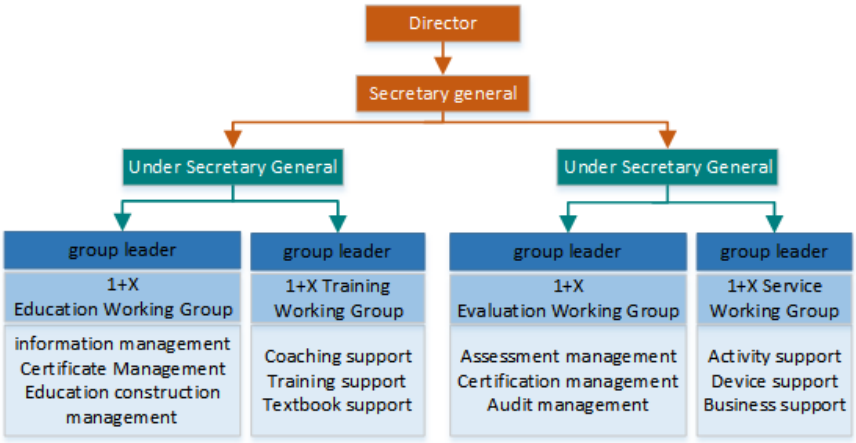

Fig. 1. "1+X" Organizational Structure

C. Use layered construction method to enrich the connotation of resource library

In this project, resources are divided into four different levels: materials, integrable ware, modules and courses according to their functional attributes. Granular material is the smallest structural unit in the resource pool; In combination with the professional core competence of automotive intelligence professionals, a number of internally related granular materials are integrated into a piece of integrated knowledge or skills; Then the integrable ware integration reflects the module of a certain work task and work item level; Finally, a structured course guided by work process is composed of several project-based modules. Online resources cover basic professional knowledge points and skills points, and also reflect the cutting-edge technology and latest achievements of industry development. The resources are rich in types, covering rich materials such as video, audio, animation, virtual simulation, PPT, graphics and images, involving courseware, animation, electronic teaching materials, industry standards, curriculum standards, teaching cases, exercises, expanded reading and other application types, text based presentations The proportion of graphics (images) and text resources is far less than 50%. Teachers and trainers can use the resource library to flexibly organize classes for students of different majors, so as to improve the universality of resource library application.

Fig. 2. Resource library mobile APP client

D. Focusing on learners, realizing the linkage of "teaching" and "learning"

The construction of the resource library has changed from the original single course resource library to the current one with the functions of learning, teaching assistance and guidance, and can improve the personalized learning function for different users, promoting the application of the resource library in college daily teaching, enterprise new employee orientation training, special new technology training, continuing education, etc. The resource library has purchased two sets of simulation software, a virtual learning environment, which can carry out classroom teaching, simulation training, vocational training and social services. According to the different learning needs of students in school and enterprise employees, different types and levels of personalized training programs can be generated in the resource library. The resource library provides ubiquitous and more flexible classroom strengthening, enterprise training and continuing education services, and further expands the coverage of the resource library by using intelligent classroom, online and offline combination and other information means.

Fig. 3. Virtual assembly and disassembly platform for pure electric vehicle power system

2.2 Rich resource content, realizing "diversified types and high originality"

A. Benchmarking knowledge and skills, taking into account individual needs

The construction of this project follows the construction logic of "integrated design, structured curriculum and granular resources", and adheres to the combination of basic resources and expanded resources. Among them, the basic resources reflect the core resources of curriculum teaching ideas, teaching contents, teaching methods and teaching processes, including curriculum standards, teaching plans, teaching courseware, explanation videos and other resources necessary to reflect teaching activities; Expand resources to reflect the cutting-edge technology and latest achievements of industry development, including student works, exercise question bank, simulation software and other related resources. Learning users log in to the resource database platform with different identities, and can carry out independent learning, school curriculum teaching and related training. They can also carry out resource retrieval, information query, data download, teaching guidance, learning consultation, discussion and question answering, employment support and other learning activities. In order to meet the professional development requirements and the personalized needs of different users, the project strengthens the integrated design of the operation platform and resources. Guided by the needs of industrial development and user needs, and combined with the characteristics of the profession, the project designs the resource content and operation platform as a whole, and builds a comprehensive resource attribute logo, which is more distinctive and forward-looking.

B. Keep up with the construction requirements and improve the service content

Based on the new professional directory of the Professional Directory of Vocational Education (2021), in the information 2.0 era, according to the support service requirements of the Vocational Education Professional Teaching Resource Library Construction Manual (2019), and according to the corresponding standards, ideological and political teachers, professional teachers, relevant students, and professional companies will work together to further enrich professional introductions, teaching documents, professional standards, technical standards, homework and evaluation systems Exercise library (examination library), enterprise cases, double teacher team, employment and position, product and culture display and other relevant contents of the course, to ensure the accurate connection between the course content and the standard requirements. At the same time, we will strengthen the introduction of high-quality resources and actual production cases of enterprises, reflect the application and development trend of new technologies, new processes and new equipment in relevant industries and

enterprises, and strengthen the vocational education characteristics and social adaptability of the resource library.

C. Standardize teaching links and ensure intellectual property rights

Improve the management and service of online and offline learning process, integrate the use of teaching resource library into the whole process of professional teaching such as school teaching design, teaching implementation, teaching process record and teaching evaluation, apply it to the preparation, teaching, assessment, test, examination and other aspects of teachers in the school, and pay attention to the standardized application of teaching resource library in teaching. In the application process, adhering to the principle of timeliness, moderation and moderation, we will maximize the role of resources, while respecting intellectual property rights. We will develop and use them in a reasonable and standardized manner in accordance with the Copyright Law of the People's Republic of China, and the original resources account for 90% of the total resources in this resource pool.

2.3 The quality system is perfect, ensuring "conforming to standards and advanced level"

A. Gather the elites of schools and enterprises and strengthen the implementation of division of labor

Led by Academician Li Deyi's workstation and joint laboratory, this project has established project construction leading group, construction execution group, quality supervision group, fund special management group and other organizations, gathered experts from industries, enterprises and vocational schools to participate in the construction of resource pool, joined hands with national industries and advanced enterprises in automotive professional fields such as CRRC Electric, SAIC Volkswagen, Changsha BYD, and introduced BMW ISTA system New technologies of enterprises such as intelligent automobile sensors, artificial intelligence and computer vision are updated to the resource base platform synchronously. Schools and enterprises participate in the resource base construction with clear division of labor.

B. Build evaluation indicators and improve resource quality

In order to ensure the high quality of the project construction and the completion of the construction progress as scheduled, Hunan Automotive Engineering Vocational College has established the project construction leading group, project construction execution group, project construction quality supervision group, project construction fund special management group, project construction management office and other corresponding organizations. The development, application, evaluation and updating of the resource library are carried out in accordance with various standards at all levels. The Measures for Encouraging Teachers to Use the Automotive Intelligent Technology Professional Resource Library (Trial) (QZYQB [2021] No. 3) and the Measures for Credit Mutual Recognition Management of the Automotive Intelligent Technology Professional Teaching Resource Library (Trial) (QZYQB [2021] No. 4) have been formulated Administrative Measures for the Application and Promotion of Automotive Intelligent Technology Professional Resource Bank (Trial) (QZYQB [2021] No. 5) and other "promotion" system documents. Establish a resource pool evaluation index system, collect information monthly in combination with the actual use and construction of the resource pool, collect the operation log of the resource pool and relevant data on the use of materials,

and refine the resource pool evaluation index from the perspective of practical application, so as to implement the resource quality activity evaluation.

3 Existing problems

In the process of project construction, there are some difficulties in resource construction, application and promotion. The main problems are as follows:

3.1 Professional positioning needs to be further clarified

At the project initiation stage, the orientation of the automobile intelligent technology specialty is to cultivate technical and skilled talents engaged in auxiliary research and development, production and manufacturing, testing and maintenance and other posts for key system production, vehicle manufacturing, and after-sales service enterprises in the intelligent automobile industry chain. In 2021, the new Intelligent Connected Vehicle Technology Major will lead to some overlap between the two majors in professional positioning and training objectives. Therefore, it is necessary to clarify the positioning and training objectives of the two majors, and reorganize the curriculum system of this major to adapt to the professional positioning.

3.2 The depth of application needs to be further enhanced

With the rapid development of automobile intelligence and intelligent networking, relevant professional and technical personnel urgently need to participate in relevant training on new technologies, new processes, new specifications, new standards, etc. of intelligent networking automobile technology. However, the users of the existing resource library are still mainly teachers and students. The personalized application for enterprise users and social learners is still insufficient. Efforts are needed to increase the proportion of enterprise users and social learners among resource library users, and the ability of resource library to serve enterprises needs to be strengthened.

3.3 The co construction mechanism needs to be further improved

The joint construction and use units of the resource library cover all parts of the country. The leading colleges and universities have made some efforts to promote joint construction and sharing. However, the importance of the application of the resource library is not uniform, and the software and hardware conditions of each user vary greatly. Web browsing and resource access are blocked, especially for animation and video resources. The buffer speed is slow, which affects the user's sense of experience and reduces the utilization rate and satisfaction of registered users.

4 Follow up work planning

4.1 Benchmarking national standards and restructuring professional curriculum system

Benchmarking the national professional teaching standards of automobile intelligent technology, focusing on relevant posts of upstream enterprises in the intelligent connected automobile industry chain, carrying out relevant post research and demand analysis, sorting out the knowledge, ability and quality requirements of typical posts, restructuring the modular curriculum system, integrating typical cases, competition projects and professional skills standards of enterprises, and jointly revising and improving the curriculum standards of schools and enterprises, Develop and improve digital resources such as teaching videos, animations and simulations, and synchronously update them to the resource library platform for application. Increase high-quality original resources, constantly improve the quality of resources, and strive to improve the technical level of resources in the resource pool and industrial technology upgrading simultaneously.

4.2 Keep up with the professional frontier and strengthen the ability to serve enterprises

Deepen the integration of industry and education, and strive for more social resources and support. In the resource library, we will keep up with the development frontier of automobile intelligence and intelligent networking related fields, and timely introduce new technologies, new processes, new standards and new specifications. Customize courses according to different user needs, constantly enrich and update course content and course resources, and improve the pertinence of resource library course content and resource materials to serve users. Strengthen the construction and promotion of vocational skill qualification certificate courses, and support the Alliance School to carry out the 1+X certificate pilot work in depth. Ensure that the number of new resources in the car intelligent resource library is kept at more than 10% annually, and the number of resource library users is increased by more than 10% annually.

4.3 Explore credit banks and improve the co construction and sharing mechanism

We will improve the construction, application and operation management mechanism of the teaching resource library for the automotive intelligent technology specialty, and continue to invest in updating funds. The first host college promises to invest no less than 1 million yuan of special funds every year to ensure the continuous improvement and updating of the resource library. To meet the needs of national qualification framework construction, explore the credit bank of vocational education, improve and deepen the standardization construction of resource library courses, improve and deepen the certification unit system and evaluation method of professional courses based on resource library, establish the identification, accumulation and transformation methods of learning achievements based on resource library, and realize the interconnection between different types of education, academic and non academic education, and intra school and extraschool education, Broaden channels for continuing education and learning of technical and skilled personnel.

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