

# The Construction of the Curriculum System of Transportation Engineering Electromechanical Professional Group Based on Guizhou's Transportation Characteristics

Zhongzhen Shi<sup>1, a</sup>, Zhenjun Xu<sup>2, b</sup>

<sup>1</sup> Department of Mechatronics Engineering, Guizhou Communications Polytechnic, Guiyang 550000, China;

<sup>2</sup> Department of Mechanical Engineering, Guizhou Equipment Manufacturing Polytechnic, China.

<sup>a</sup> 461403771@qq.com, <sup>b</sup> 531750737qq.com

**Abstract.** The professional group of traffic engineering electromechanics has the same professional basic platform courses with the core of engineering machinery application technology, the construction of traffic engineering electromechanical related equipment and facilities as the service object, and the realization of intelligent transportation electromechanical engineering as the goal to realize the cross-border integration of technical skills of the professional courses. Under the guidance of the curriculum concept of "wide caliber + thick foundation", it meets the needs of students' personality development and professional cross-border integration. It has formed a curriculum system in which the foundation of majors is connected, the core courses are separated and the extension courses are extended, cross-boundary, integrated and inter-selected.

**Keywords:** Transportation Characteristics; Transportation Electromechanics; Specialty Groups ; Courses.

## 1. Introduction

With the national demand for the development of intelligent transportation industry, the application of information technology, automatic control technology makes the transportation electromechanical comprehensive ability demand is higher and higher, which puts forward a new demand for our transportation electromechanical personnel training, making a large talent gap for the composite, integrated personnel training also faces new opportunities and challenges, and the professional group of the curriculum system is the key to cultivate talents, which in turn needs to be formulated to develop a professional curriculum technical skills cross-border integration of the curriculum system.

## 2. Job-driven construction of theoretical teaching content system

In the professional group talent training program, the theoretical teaching system mainly consists of basic cultural courses, platform courses and professional direction courses necessary for talent training. According to "the same engineering object, common professional foundation, similar technical fields, related vocational positions, teaching resources sharing" design group structure, the group of professions are based on the service of intelligent transportation engineering electromechanical industry chain, professional group platform curriculum system framework shown in Figure 1.

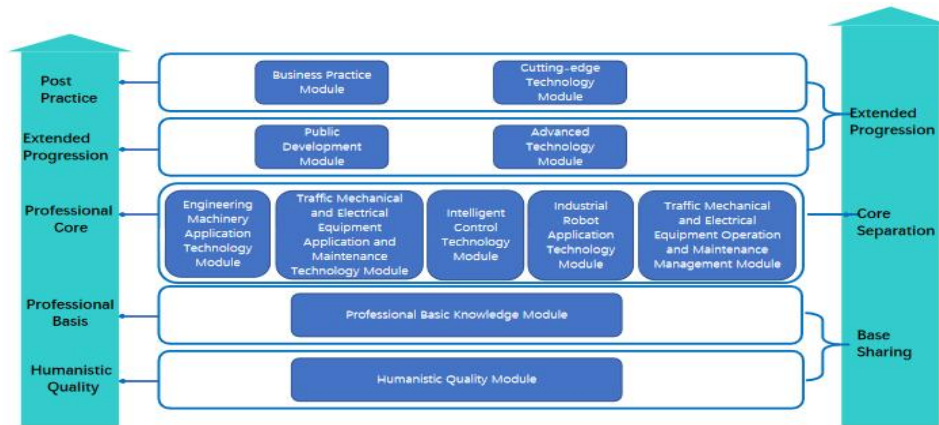


Figure 1. Professional cluster platform curriculum system framework

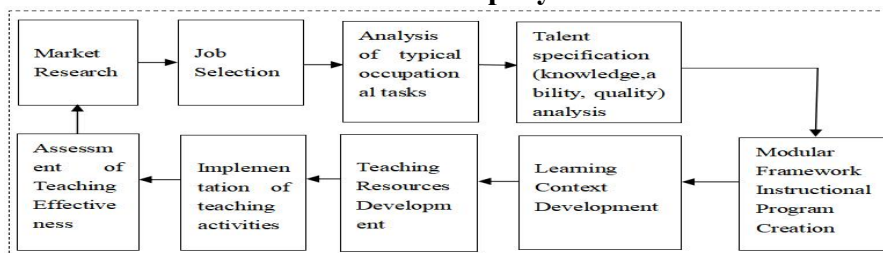
(1) Basic Cultural Courses: This course module should enable students to build up a certain foundation in humanistic qualities, professional qualities, ideology and morality, mathematical and scientific fundamentals, foreign language communication and learning ability as far as possible for the subsequent professional courses.

(2) Integrate the public technical field courses of the professional group and set up the bottom shared course group. Through the analysis of the typical work tasks of the job groups (see Table 1) for which the professional group is oriented, the knowledge, ability and quality target system of the job group has been formed.

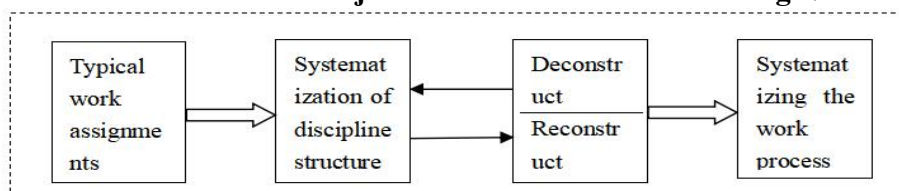
(3) Setting up the bottom shared course clusters to cultivate students' professional single ability and quality objectives as well as the learning of corresponding knowledge contents.

The construction idea is based on the "nine-step cycle, three-three-three" model of the curriculum system construction of "industry demand as the goal, competence training as the base, student-centered", breaking the structure of the discipline system, and constructing a "combination + matrix" modular curriculum system under the talent cultivation mode (shown in Figure 2 below):

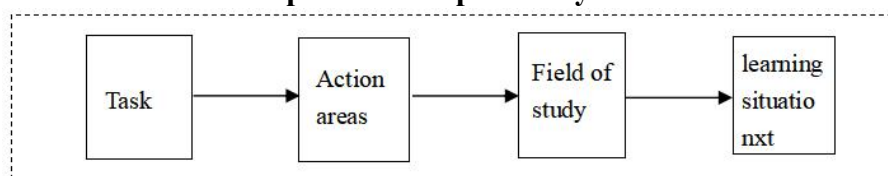
#### "The Nine-Step Cycle":



#### "Three streams" of job-embedded curriculum design:



#### The "triple shift" in proximity to work:



#### The "Three Steps" of Work-Friendly Curriculum Development:

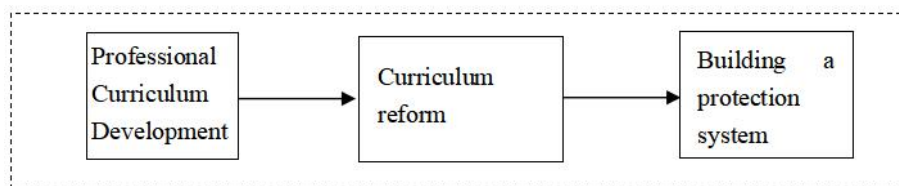


Figure 2. "Nine-step cycle, three-three-three" curriculum system

### 3. Setting up professional orientation courses in accordance with the guiding principle of "employment orientation"

According to the guiding ideology of "employment-oriented", in the professional direction of the curriculum, around the professional direction of the service-oriented transportation engineering electromechanical industry, focusing on the employment of students to strengthen the knowledge and ability training.

(1) To develop and form a group of middle-level discrete courses targeting job-specific competency training for the positions in which students are employed;

(2) When the job is not very clear, together with the business backbone of a typical service-oriented enterprise, we design special competencies with the characteristics of a comprehensive practical training program for the typical work tasks of the students' job groups, and design a group of courses that are mutually selectable at the senior level.

### 4. Construction of "double-cycle" professional group practice teaching system based on engineering-learning integration

With the goal of "professional group" docking "vocational job groups", with the improvement of students' vocational ability as the base, and with the reform of professional practice teaching mode as the breakthrough, we innovate the practice teaching system of traffic engineering electromechanical professional group. Based on the general skills and specialized skills training of each specialty in the cluster, we systematically design the practical training system, integrate the practical teaching resources of core specialties and related specialties, and set up practical training bases. Through the forms of "modularization" and "project-oriented", we carry out the series construction of practical training teaching content, and build a system of "theory-practice", "theory-practice", "theory-practice", "theory-practice", "theory-practice", "theory-practice" and "theory-practice". A "double-cycle" practical teaching system characterized by "theory-practice" and "theory-practice" has been constructed.

### 5. Building a "teaching, learning and doing" teaching model

(1) Through "project-led, task-driven", the teaching mode of "teaching, learning and doing as one" is formed. According to the general idea of "combining engineering and learning" and the ability training requirements of the job objectives, combined with the typical tasks of the job, according to the positioning of the course in the professional curriculum system and the preset ability training objectives, to complete the overall teaching design of the course, the design of the difficulty of the teaching and learning of a number of projects to lead the course in a hierarchical manner, each project has a few tasks to drive, requiring the use of "teaching, learning and doing" (teaching, learning and doing). Each project has several tasks to be driven by the requirement of "teaching, learning and doing as one" teaching mode to implement. According to the "information, planning, decision-making, implementation, inspection, evaluation" of the work process, so that students learn by doing, teachers in the implementation of the project in the teaching, students in the completion of the project in the independent study and research, mastery of relevant skills, problem solving to improve their ability to achieve the teaching objectives in an orderly manner. At the same time, the school and enterprises jointly participate in teaching evaluation.

(2) Build a platform for skill competitions to stimulate students' potential. Form a skills competition team and jointly develop the school skills competition program with reference to the

national, provincial and municipal skills competition programs. Each competition consists of a professional teacher and an enterprise expert as the person in charge. Every year, all the students in the professional group of the school skills festival participate in the competitions of clamping, electrician, engineering machinery maintenance operation, microcontroller, mechatronics and other projects, and the outstanding students participate in the municipal and provincial competitions, which stimulates the students' potential and the spirit of teamwork. The competition process pays more attention to the actual operation of the training, these students after graduation can be suitable for the requirements of modern manufacturing jobs, better for the local economic construction services.

## 6. Constructing shared teaching resources for professional groups centered on high-quality courses

The university-enterprise co-constructed professional group curriculum system is finally established based on the learning outcome orientation. Taking the "national quality online open course" as the standard, cultivating students' core job competence as the goal, based on the course learning outcome-oriented general course module + humanistic quality course module + professional course module (professional group platform course, professional direction course, career development course) courses, the university and enterprises jointly build a "1+X" certificate based on the "basic sharing, core separation, expansion of mutual selection, progressive competence" outcome-oriented curriculum system. The university and enterprises jointly build a result-oriented professional group curriculum system based on the "1+X" certificate, which is "sharing foundation, separating core, expanding mutual selection, and advancing ability", see Fig. 4.

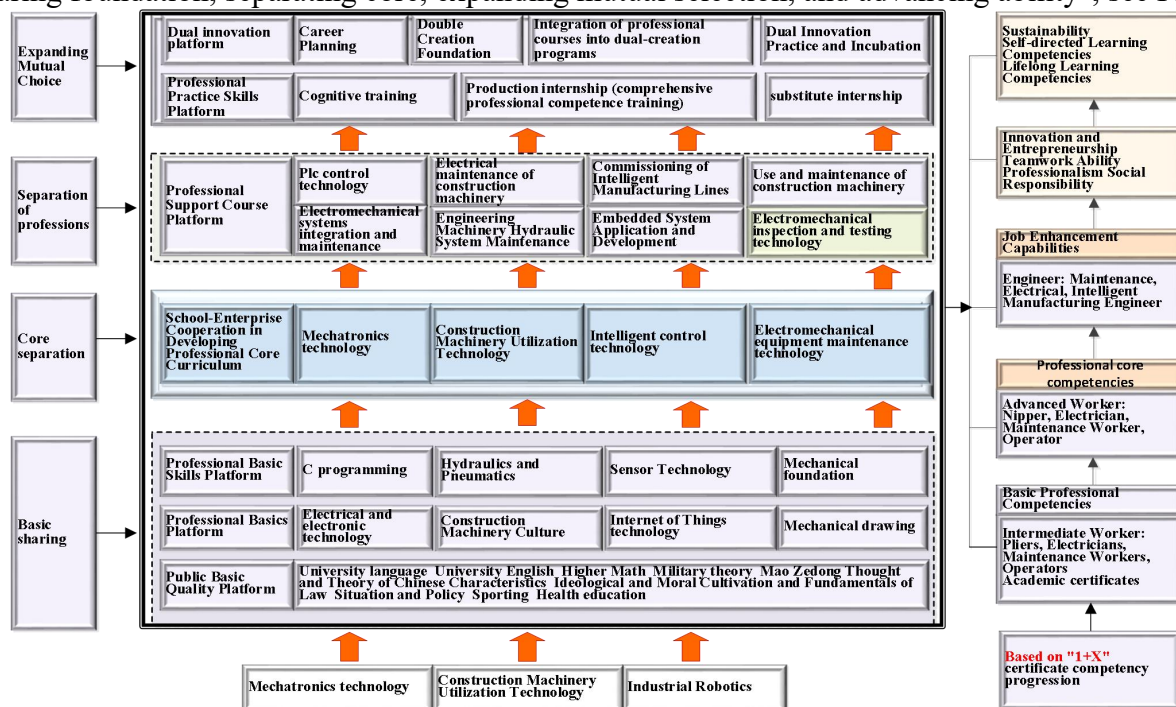


Figure 3. Transportation Engineering E&M Curriculum System

## 7. Summary

Traffic engineering electromechanical professional group curriculum system is to cultivate intelligent transportation electromechanical engineering talents as the goal, job-driven construction of theoretical teaching content system, breaking the structure of the discipline system, based on the requirements of vocational positions on knowledge, skills, attitudes, and at the same time give full consideration to the needs of the students' careers, the selection of teaching content, set up the curriculum, the formation of the modularization of theoretical and practical integration of

vocational positions as the guide to the workflow. Curriculum structure. Setting up professional direction courses with "employment orientation", focusing on the transportation engineering electromechanical industry that the professional direction serves, and strengthening the knowledge and ability cultivation for the students' employment positions. Through "project-led, task-driven", the teaching mode of "teaching, learning and doing as a whole" is formed, and a learning outcome-oriented, school-enterprise co-constructed professional group curriculum system is finally established. Through the construction of the curriculum system, comprehensive professional skills knowledge is provided for the cultivation of intelligent transportation electromechanical engineering talents.

## Acknowledgements

Fund Project:Key Project of Guizhou Vocational and Technical College of Transportation (2023A07ZK); Plan for the Construction of high-level Vocational Schools and Majors with Chinese Characteristics [Teaching Letter [2019] No. 14].

## References

- [1] Ren Tianjuan. The construction of curriculum system of mold design and manufacturing under the background of vocational education undergraduate[J]. Mold Manufacturing,2024,24(03):95-96.
- [2] Chen Dalong. Research on the construction of professional curriculum system of electromechanical technology application under the background of intelligent manufacturing[J]. Agricultural Machinery Use and Maintenance,2023,(11):125-128.
- [3] LI Yongjie, LEN Xuefeng, REN Aizhen, etc. Research and Practice on the Construction of Curriculum System of "School-Enterprise Collaboration, Post-Course-Certificate-Race, Four-Dimensional Integration" under 1+X Certificate System--Taking the Group of Mechatronics Technology Specialties as an Example[J]. Industry and Information Technology Education,2023,(10):42-47.
- [4] Wu Fuxi. Research on the Construction of Composite Talent Curriculum System of Electromechanical Specialties under the Background of Government Leading[J]. Southern Agricultural Machinery,2023,54(16):185-188.
- [5] LI Xiaohong, YU Huiling, WANG Ke. Construction and practice of curriculum system of urban rail transit electromechanical technology under the background of "double-high" construction[J]. Industry and Technology Forum,2023,22(09):258-259.
- [6] ZHAO Zhenrong, ZHANG Yong, WU Caixia et al. Exploration and Practice of Integrated Curriculum System Construction for School-Enterprise Cooperation--Taking Wuxi Science and Technology Vocational College Mechatronics Technology Major as an Example[J]. Education and Teaching Forum,2022,(40):115-119.
- [7] Nong Yingbin, Ma Linshuang. Exploration on the Construction of Middle and Higher Vocational Curriculum Articulation System--Taking Electromechanical Integration Technology Major as an Example[J]. China Education Technology Equipment,2021,(15):53-55.