

Research on the Countermeasures to Accelerate the Development of First-Class Electrical Engineering Discipline

Taking the Electrical Engineering of Xichang University as the Research Object

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Abstract—The construction of first-class disciplines is the basis for the construction of first-class universities. The Ministry of Education put forward the requirements for "double first-class" construction of universities in 2017. Universities in various provinces actively implemented them, formulated specific methods, and promoted the connotative development of higher education. This article takes the electrical engineering discipline of Xichang University as the research object, expounds the existing construction foundation of the discipline from the aspects of advantages, existing achievements and social impact, and proposes the goal of accelerating the first-class construction in 2020, and carries out concrete analysis of construction measures in the terms of talent cultivation, scientific research, team construction, social services, and cultural heritage.

Keywords: *first-class disciplines, first-class industry, electrical engineering, application*

I. INTRODUCTION

The construction of first-class universities and first-class disciplines is a strategic decision made by the Party Central Committee and the State Council to substantially improve the level of China's higher education, strengthen the country's scientific and technological competitiveness, and lay the foundation for development under the new international education situation. In 2017, the Ministry of Education and other ministries and commissions jointly issued the "Implementation Measures for the Promotion of the Construction of World-Class Universities and First-Class Disciplines (Interim)", which adhered to the central requirements of "Chinese characteristics and world-class", and insisted on the basic principles of "taking discipline as the basis, performance as the lever, and innovation as the driving force", and adhered to the connotation construction and the implementation of the basic task of moral education. It is necessary to build universities and guide the development of connotation and characteristics according to the layout of "first-class university" and "first-class discipline". Also, it is required to use open competition to

effectively stimulate the vitality of construction, continue dynamic management to break the fixed ranking, and coordinate the construction to promote the deepening of comprehensive reform.

In 2017, Sichuan Province issued the "Implementation Opinions of the Sichuan Provincial People's Government on Coordinating and Promoting the Construction of First-class Universities and First-class Disciplines", which confirmed the construction goals, construction tasks, and reform tasks of higher education, and made clear requirements for the "double first-class" construction. Xichang University further clarified the strategic layout and development positioning of the disciplines in the career development plan of "13th Five-Year Plan", optimized the discipline structure, promoted the discipline construction, and gave full play to the leading role of discipline construction to effectively enhance core competitiveness. Also, Xichang University further deepened the transformation and development of the school into an application-oriented university, and continuously strengthened the school's ability to train talents, conduct scientific research, serve regional economic construction and social development, and promote cultural heritage. Xichang University focuses on promoting the construction of university of applied technology. It has three stages of development: near-term (2020), mid-term (2030), and long-term (2050). According to the three construction levels of key construction, accelerated construction and accelerated cultivation, the overall idea of discipline construction is to realize the five development goals of high-level discipline cluster, high-level discipline team, high-starting discipline platform, high-quality innovative personnel training, and high-level foreign cooperation and exchange. In a word, the "1-3-3-5" development strategy of overall discipline construction will take discipline as the foundation, focus on building the peak of discipline field, and promote the overall development and construction of the university through the construction of first-class disciplines.

II. OVERVIEW OF ELECTRICAL ENGINEERING DISCIPLINE

Electrical engineering is the core and key discipline of modern science and technology. The traditional electrical engineering discipline is the sum of electrical and electronic systems and related disciplines derived from them; the modern electrical engineering discipline has a wider scope, covering almost all engineering disciplines related to electronics and photons. At present, the state is speeding up the investment in the construction of UHV transmission network, new energy power generation and smart power grid system. These changes in the environment bring opportunities and challenges to the establishment of related disciplines of the electrical engineering. In order to match the width and depth of knowledge in the subject field, it is necessary to reconsider the subject direction, curriculum setting and content optimization of electrical engineering, so that the subject can better respond to the development of society, the improvement of science and technology, and the needs of students.

The evaluation of electrical engineering discipline by the Ministry of Education was first carried out nationwide in 2002. So far, four rounds of comprehensive evaluation have been completed, including four first-class indicators, such as teachers and resources, personnel training quality, scientific research level of teachers and students, social services and discipline reputation, and eleven second-class indicators. At present, Tsinghua University, Huazhong University of Science and Technology, Xi'an Jiaotong University, Zhejiang University and Chongqing University have the national first-class key disciplines of electrical engineering, and 10 universities including Hebei University of Technology, Shenyang University of Technology, Harbin Institute of Technology and North China Electric Power University have the national second-class key disciplines of electrical engineering.

III. CURRENT SITUATION OF ELECTRICAL ENGINEERING OF XICHANG UNIVERSITY

Xichang University is located in Liangshan Prefecture, where there are abundant renewable resources such as water resources, wind energy, solar energy, etc. The land area of Liangshan Prefecture only accounts for 6 % of the national area, but the water resources account for 10.5% of the national water resources, and the exploitable amount accounts for 15% of the national amount. Relying on the local power industry with rich resources, the discipline of electrical engineering has formed a training mode of applied technical electrical engineers highly suitable for the local power industry, with a reasonable positioning, practical training and a perfect platform for entrepreneurship and employment. Xichang University adheres to the school-running orientation of "serving Sichuan Province, radiating the southwest, training high-quality applied talents for regional economic and social development based on Liangshan Prefecture", and insists on the working principle and ideological guidance of "regional school-running orientation, local specialty setting, professional training objectives and practical teaching process". Based on the local

current situation, the electrical engineering specialty should strengthen the deep integration of school and enterprise, and build a training base outside the school which can connect with the specialty seamlessly, such as Daqiao Hydropower Development Corporation, Liangshan Prefecture, Xichang Steel & Vanadium Co., Ltd. of Panzhihua Iron and Steel Group, Xichang 800kV Converter Station of State Grid Operation Company, Liangshan Power Supply Company of State Grid Corporation of China, Xichang Power Co., Ltd., Liangshan Maintenance Company of State Grid Operation Company, Jindongzi Power Station of Mianing County, Dechang Wind Power Co., Ltd. and so on, forming a distinctive professional practice teaching system.

There are 10 full-time teachers in the electrical engineering discipline of the university, among whom 5 teachers have senior professional titles, accounting for 50%; and 9 teachers have master's degree or above, accounting for 90%. There are 4 teachers with double abilities, 1 national registered electrical engineer, 1 evaluation expert of science and technology project of Sichuan Province, 3 evaluation experts of government procurement of Sichuan Province, 1 academic leader of Liangshan Prefecture, 1 reserve candidate of academic leader of Liangshan Prefecture, and 1 evaluation expert of science and technology project of Liangshan Prefecture. The teachers have set up two scientific research teams of "new energy power system" and "intelligent manufacturing", with strong scientific research ability. Centering on the electrical engineering resources of Panzhihua-Xichang region and closely combining with the needs of local economic development, they have presided over and completed 4 provincial and ministerial scientific research projects, and 12 municipal scientific research projects, with a total scientific research fund of more than 800000 yuan. They have published more than 90 papers, and obtained 3 terms of provincial and ministerial teaching and scientific research achievements, 4 terms of provincial and ministerial teaching and scientific research achievements, and 4 patents. At the same time, the teachers also actively carry out horizontal scientific research cooperation with local large and medium-sized enterprises, such as Daqiao Hydropower Development Corporation, Liangshan Prefecture, Xichang Steel & Vanadium Co., Ltd. of Panzhihua Iron and Steel Group, and Liangshan Power Supply Company of State Grid Corporation of China. The application of results to production should be strengthened.

Since the establishment of the major of hydropower and power system in 1992 and the undergraduate major of electrical engineering and automation in 2005, the university has trained nearly 1100 undergraduates, 900 junior college students and 1200 adult education students. Students' employment is mainly distributed in the power system and related industries in the southwest, and radiates the national power system and industries, such as southern power grid, northwest power grid, etc. Most of them have served as industry backbones, and have played a core leading role in Liangshan power system.

IV. THE GOAL OF BUILDING A FIRST-CLASS DISCIPLINE IN THE INDUSTRY

According to the actual development and the needs of discipline layout, Xichang University focuses on the construction of two first-class disciplines, such as crop science and animal husbandry, and one second-class discipline of Chinese minority language and literature. It will speed up the construction of four first-class disciplines, namely, education, water conservancy engineering, environmental science and engineering, and business management, and accelerate the development of four first-class disciplines, such as food science and engineering, electrical engineering, fine arts, and sports, and one second-class discipline of Chinese language and literature. Based on the characteristics of abundant renewable resources such as water resources, wind energy and solar energy in Panzhihua-Xichang region, the discipline of electrical engineering further integrates and optimizes the research direction of the discipline around the field of intelligent electrical system and related industries, strengthens the training of discipline leaders and backup candidates, builds a stable and scientific research team and discipline echelon, and adds the undergraduate program of electrical engineering and intelligent control, so as to achieve a breakthrough in the national-level discipline platform. And then, the electrical engineering and automation major has been built into a characteristic specialty of Sichuan Province, achieving the first-class industry in China.

The construction goal of accelerating the development of electrical engineering discipline to be first-class in the industry is divided into three stages: the short-term goal of being first-class in the industry, the medium-term goal of being first-class in Sichuan Province, and the long-term goal of being first-class in the west of China. By 2020, the number of students of electrical discipline will be expanded to 600, and 4 talents with high academic qualifications and professional titles will be introduced to enrich the teaching staff. 2 million yuan will be invested in experimental equipment, and 1 million yuan will be spent on scientific research. The order-type talents training will be carried out in cooperation with many enterprises, and the undergraduate course of smart power grid information engineering will be opened. The specialty of electrical engineering and automation will be built into the specialty of Sichuan Province, so as to achieve the first-class discipline of the industry.

V. MEASURES FOR CONSTRUCTING THE FIRST-CLASS DISCIPLINE IN THE INDUSTRY

With the guidance of "facing Sichuan Province and serving the national power industry based on Liangshan Prefecture", the discipline of electrical engineering cultivates the advanced applicable engineering and technical personnel with correct political direction, sound personality, healthy body, good scientific and cultural literacy, high sense of social responsibility, innovative spirit, adapting to the needs of the first-line positions in the power industry serving the local economic development, and solving the practical

production problems in production line, such as operation and maintenance, power engineering construction and management, power market and power enterprise management. In order to achieve the goal of constructing first-class electrical engineering discipline in 2020, the construction content and relevant measures are mainly carried out from the following aspects.

A. Personnel training

Xichang University should strengthen the connotation construction, constantly promote the reform of talent training mode, and improve the quality of application-oriented talent training. According to the market changes and industry needs, it is necessary to adjust and improve talent training programs, and increase the construction of curriculum system and curriculum reform. With the curriculum reform as the core, teachers and students are encouraged to participate in the application, construction and scientific research. It is required to combine the scientific research of students with the training of talents, combine the scientific research with the education of professional students, build a teaching system that is suitable for the training objectives of application-oriented talents, and integrate the training of first-class talents into the construction of first-class disciplines, so as to promote the effective combination of discipline construction and personnel training.

According to the direction of emerging industries in the national development strategy, and in close combination with the needs of the national smart grid construction, Xichang University will open the undergraduate program of smart grid information engineering, make the enrollment, strengthen the deep integration of schools and enterprises, go deep into the power system in the western region, and develop the order-type personnel training in cooperation with enterprises in coastal areas and urban agglomerations in the Yangtze River Delta, so as to cultivate senior engineering and technical personnel with strong practical ability, high comprehensive quality and innovative consciousness according to industry requirement.

B. Scientific research

Under the strategic background of developing the university through scientific research, it is necessary to formulate scientific research assessment methods suitable for the development of the university, establish scientific and reasonable scientific research management system with orderly operation, and improve various management systems and scientific research reward systems. It is required to establish "new energy power system", "intelligent manufacturing" and other scientific research teams to apply for high-level projects together with cooperative colleges and universities, achieve a batch of high-level academic achievements, and expand academic and social influence. The discipline teams should make in-depth analysis of production technology problems and needs, and establish long-term and stable cooperative relations in accordance with the principle of "complementary advantages, mutual benefit and common development", and continuously

broaden and deepen the cooperation, so as to quickly transform the scientific and technological advantages of scientific research teams into the market competitiveness of enterprises. At the same time, Xichang University should strive to complete 5 horizontal scientific research projects, more than 10 international high-level papers, 50 core journal papers, more than 8 monographs or textbooks, 10 authorized patents, 4 provincial and ministerial scientific research projects, 8 municipal scientific research projects, with a total scientific research funding of more than 1 million yuan, achieving rapid transformation of scientific research results.

C. Team building

At the turning point of the "application-oriented" transformation, Xichang University will build a high-level teaching staff with "double teachers and double abilities", and form a full-time teaching staff with reasonable proportion of educational background structure, professional title structure, age structure and engineering background. According to the professional curriculum and discipline development plan, young teachers should be reasonably arranged to work with salary in the cooperative enterprise, and actually participate in the production, management and scientific research tasks of the front line of the enterprise. And Xichang University will establish a continuous, stable and effective base for improving teachers' practical training ability. It is necessary to establish cooperation with Germany, Britain and other countries of developed manufacturing, send professional teachers of disciplines abroad to carry out academic exchange activities or enter first-class enterprises to participate in training and learning. Four new doctoral students will be introduced, and 5 new external teachers will be recruited as the backbones of the industry every year, bringing the total professional faculty to the scale of the 38 people, and 60% of the teachers belong to the type of "dual teachers and abilities". Xichang University actively select and train professional leaders and young and middle-aged backbone teachers, implement the leading effect of famous teachers, and improve the teaching, practical, and scientific research capabilities of young and middle-aged backbone teachers, and make these teachers become the backbone of teaching and scientific research.

D. Social services

The discipline of electrical engineering continuously improves the service quality, enhances the service will, focuses on the service effectiveness, and directly devotes itself to the construction and development of local society and industries related to power system and smart grid with its own resources, forming a training mode of applied technical engineers highly suitable for the development of discipline and local industries. This will provide talents and technical support for the highly intelligent maintenance, operation and management of power system, smart grid and other equipment in the southwest of China. The teachers of scientific research team participated in more than 30 projects related to the design and research of power system and smart grid in the southwest of China and the whole country, as well

as the demonstration of intelligent upgrading and transformation.

E. Cultural heritage

With the saying of "having the inventiveness, standing based on electrical engineering", it is necessary to carry out the theme lecture of "craftsman spirit", and learn the new connotation given by craftsman spirit in the new era. It is required to complete the college's cultural construction goal of "unique machine and electronic policy", and train students to have the spirit of integrity, pragmatism, innovation, concentration, and striving for perfection to serve the local economic construction.

VI. CONCLUSION

The discipline of electrical engineering of Xichang University will adhere to the work of taking industrial demand as the guide, serving the local area as its own duty, taking the deep integration of school and enterprise as the carrier, taking the training of applied technology ability as the goal, taking the construction of teachers with "double teachers and double ability" as the key, taking scientific research as the support and cultural construction as the guide, implement the order-type personnel training mode, build the applied technology talent training base based on Liangshan Prefecture, serving the first-line needs of Sichuan Province and the national power industry, and become the "cradle" for training local applied technology electromechanical engineers.

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