

Construction of Talent Training Mode Based on Green Petrochemical Strategic Pillar Industry Cluster

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Abstracts: Through deep understanding of the connotation of green petrochemical strategic pillar industry cluster policy, and thorough analysis of the current situation, this paper finds out the existing problems in college talents training, and explores how to build a talent training mode based on green petrochemical strategic pillar industry cluster by taking Guangdong University of Petrochemical Technology as an example, with the purpose of changing the traditional "professional talents" training orientation and training mode of colleges and universities, as well as cultivating high-tech talents to meet the needs of the development of industrial clusters and serving regional economic and social development.

Keywords: green petrochemical; industrial cluster; application type; talents training

1. Introduction

1.1 Industrial Cluster

Most scholars believe that industrial cluster refers to a spatial cluster which is closely linked to a spatial cluster through crisscross network relations, which is concentrated in a certain area of a certain industry, with different scale enterprises with the relationship of division of work and cooperation, and various institutions and organizations related to its development. [1]As an industrial space organization formed to create competitive advantage, it has the advantages of group competition and the scale benefit of agglomeration development. The core resource of industrial cluster is the high-quality professional skilled talents with advanced management thought, innovative spirit and strong professional ability. [2] Industrial cluster not only promotes the rapid development of regional economy, but also promotes the development of higher education, and puts forward new requirements for the training objectives of higher education talents.

1.2 Guangdong Provincial Green Petrochemical Strategic Pillar Industry Cluster

As is known to all, the petroleum and chemical industry is one of the important pillar industries in Guangdong Province, which has the characteristics of capital, technology and talent concentration, and plays an important role in the whole province and even the national economic system. According to the policy interpretation of Action Plan for Guangdong Province Strategic Pillar Industries Cluster of Green Petrochemical Development (2021-2025), Guangdong's petroleum and chemical industry has developed healthily and steadily in recent years, with an industrial scale of 1.5 trillion yuan, ranking the third in the country, and gradually forming an integrated development pattern of upstream, middle and lower reaches industrial chain such as refining, basic chemical and fine chemical industry. As one of the important petrochemical bases in China, it has the characteristics of the basic formation of the coastal petrochemical industrial belt, the rationalization of industrial structure, good quality and benefit of key petrochemical enterprises, the successive settlement of major petrochemical projects, and remarkable results of foreign joint venture cooperation. It is building a world-class green petrochemical industry cluster and moving towards the middle and high end of the global value chain. [3] In the process of accelerating the development of green petrochemical strategic pillar industry cluster, there will be many problems and challenges. In order to enter the ranks of world-class green petrochemical industry cluster, corresponding measures should be taken, and one of the most important measures is to strengthen the personnel training of petrochemical industry.

2. Analysis of the Current Situation of the Applied Talent Training Mode

Most developed countries in the world have formed a mature mode of applied talents training in colleges and universities. The vocational training, curriculum setting, diversified training institutions and legal system of applied talents in American colleges and universities have adopted the vocational curriculum system which meets the social needs to train innovative and entrepreneurial talents, builds practical oriented vocational curriculum system, constructs the education mode of interdisciplinary education, as well as a high-quality teacher team. It has the strategy of improving the training of talents such as the legal guarantee body of education[4]. There are many forms of cooperation in production, learning and research, including co-construction of practice bases, order training, and co-construction of R & D centers.

German university of applied science and technology is characterized by clear aim of talent training, broad and flexible specialty, and the teaching method is integrated with production and education. In classroom teaching, teachers often use the problems in the actual production as research topics, let students learn, discuss research together with them, and promote the students' learning with projects, which not only provides the solution to the problems for enterprises, but also imparts the scientific research results to students, and ensures the teaching quality and level through cases. [5]

Although most of the talent training models have already shown their advantages and reliability, there are still many problems in the current applied undergraduate training mode, such as the training objectives, practical teaching, the construction of high-quality teacher team, the cooperation between schools and enterprises. In the background of pillar industry cluster economy, it is necessary to adjust some talent training mode and integrate various related resources to meet the needs of the change of economic model and the development of the times.

3. Talent Training Innovation Model Based on Green Petrochemical Strategic Pillar Industry Cluster

Comments on Guangdong Provincial People's Government on Fostering and Developing Strategic Pillar Industrial Clusters and Strategic Emerging Industrial Clusters (hereinafter referred to as "Comments") put forward that the quality and efficiency of petrochemical industry development in Guangdong province will be further improved by 2025, the comprehensive strength and sustainable development capacity will be significantly enhanced, the status of global value chain will be significantly improved, and the world-class green petrochemical industry cluster will be basically formed, thus entering the ranks of world-class green petrochemical industry cluster.

In order to achieve this grand goal, many key problems need to be solved. For example, a large number of innovative, applied and high skilled talents are needed for the improvement of production capacity; The traditional talent training model can not meet the needs of petrochemical application talents training under different production process of five refining and chemical integration bases in Guangdong; At present, the training, practice and practice resources close to the actual production technology of petrochemical enterprises are insufficient in the current talent training process; The high requirements of petrochemical enterprises for safety production do not allow students to practice in production site; The ability of engineering practice application innovation of graduates is not enough; The quality of talent training does not match the requirements of Green Petrochemical Enterprises on the comprehensive quality of talents. In view of the above problems, according to the research and analysis of the current situation, combined with the typical experience of foreign applied talents training, the paper explores the characteristics of talent demand for industrial development. Taking Guangdong University of Petrochemical Technology as an example, from the university level, enterprise level, the local government and the legal policy level respectively, the countermeasures for the development of green petrochemical strategic pillar industrial clusters will be elaborated.

3.1 In Terms of University

3.1.1 Talent Training Concept

With the purpose of serving the industrial cluster and meeting the talent demand of the industrial cluster, a "cluster" training mode is formed around the demand of the industrial cluster for technical talents. Continue to deepen the reform of the results oriented talent training mode, earnestly implement the requirements of professional certification into specific links, implement the requirements of

excellent engineer training in the training program curriculum and teaching links, and integrate the concept of student-centered, results oriented and continuous improvement into all aspects of talent training. Improve the high-quality specialty group with green petrochemical characteristics closely related to the green petrochemical industry chain, form a high-quality applied talents training system, comprehensively improve the quality of undergraduate teaching and personnel training, as well as a new high-quality education and teaching system.

3.1.2 Talent Training Process

(1) Construction of Professional Clusters

The construction of professional clusters should start with professional system, curriculum system, teaching system, practical training system, R & D platform and teacher platform, and pay attention to industry demand, knowledge demand, technical demand, ability demand, development demand and intelligence demand. Focus on optimizing the professional structure, adjust the enrollment plan, develop and improve the characteristic advantage specialty group closely related to the green petrochemical industry chain, namely, five major engineering groups, namely Oil and Natural Gas Engineering, Chemical Engineering and Materials, Control Engineering and Information Technology, Power and Machinery Engineering, Environment and Biology, to meet the talent demand of the whole chain of green petrochemical industry; Conduct in line with the needs of green petrochemical industry, adhering to the concept of "integration of professional and ideological and political education, sharing of resources between industry and school, professional degree and ability development", relying on the advantages of Sinopec Maoming Petrochemical Company, Sinopec Guangzhou Petrochemical Company, the Green Petrochemical Industrial College will be jointly established with petrochemical backbone enterprises and industries to jointly formulate talent training programs, participating in the process of talent training and deepening the integration of production and education; reconstruct the training plan, strengthen the characteristics of training, and carry out the teaching practice of dual system talent training mode and target oriented curriculum; publish the teaching materials with combined characteristic of green petrochemical production and education, build a high-quality teaching system and closed-loop quality monitoring and guarantee system for the deep integration of production and education, and cultivate green petrochemical talents who identify with the culture, innovation, application, high skills and develop with good morality, wisdom, good work and all-round development.

(2) Construction of curriculum cluster

First, strengthen the construction of the curriculum system of industrial cluster, adhere to the industry cluster oriented and ability-based construction idea, and cooperate with industry and enterprises to develop curriculum system based on professional cluster, so that the training of petrochemical professionals can meet the needs of job vacancy (group). According to the development demand of Guangdong green petrochemical strategic pillar industry cluster, the training mode of Dual-System Talent Cultivation Mode of "Teaching for Cultivation, Cultivation for Spirits" can be expanded appropriately, and the relevant courses content of petrochemical industry cluster can be increased. The dual system includes the curriculum education system (including all the single theoretical and practical courses) based on the deep integration of production and education and the quality expansion project education system designed by the curriculum (curriculum combination or curriculum group) and multi-dimensional penetration design of industry, local or scientific research resources based on the comprehensive quality requirements in the training objectives; The quality development education system is implemented in the form of project. The integration of production and education with "strong muscles and bones" curriculum system (including all the single theoretical and practical courses) aims to cultivate and improve the application ability and practical ability; The multi-dimensional infiltration of "casting spirit" quality expansion education system aims to cultivate and temper ideological quality, human feelings, practical consciousness and innovative spirit. [6] The direction, content and evaluation methods of curriculum cluster should be jointly determined by industry, enterprises and schools, curriculum standards for professional standards should be formulated, relevant curriculum system of green petrochemical industry cluster should be established, and the cultivation of core literacy should also be paid attention.

Secondly, actively develop and build the relevant curriculum resources supporting the green petrochemical industry cluster. According to the demand of industrial cluster for talents, the change of talent training plan inevitably requires the corresponding adjustment of the teaching materials to meet the requirements of vocational access. In order to solve the problem that senior management personnel in enterprises give students short class hours and can not guide them in depth, the school can develop

MOOCS resources by contacting relevant platforms, providing students with convenient learning anytime and anywhere, making students have more opportunities for independent learning and effectively stimulating students' enthusiasm for professional English learning, as well as achieve good teaching results in the process of professional cluster teaching.

(3) Construction of Teachers Cluster

First, further strengthen the construction of relevant teachers in green petrochemical industry cluster, introduce and cultivate young teachers in many ways, expand the number of highly qualified teachers and optimize the structure of teachers. The position and role of the teacher development center should be implemented from personnel, funds and system, and the channels for teachers' professional development and training should be actively expanded, and support teachers to undertake high-level educational reform projects and national fund projects.

Secondly, strengthen scientific research support teaching, and further improve teachers' teaching ability and level. Pay attention to the teaching of scientific research and improvement of teaching mechanism and ways of scientific research. Strengthen the transformation of scientific research resources and promote the quality of talent training. Enrich teaching content with scientific research results, expand the course depth, keep the teaching content in line with the pace of the times, reflect the development needs of green petrochemical industry cluster, and enable students to master the working skills and methods effectively before graduation. Based on scientific research and innovation team, the undergraduate tutor system is implemented. Through the scientific research to promote teaching, promote teaching reform, actively play the role of scientific research on teaching, and constantly improve the quality of teaching and talent training.

Finally, the cooperative mechanism is established to improve the mechanism of employing technical personnel of enterprises and institutions as practical training teachers (mentors) and playing the role of external teachers. Taking the construction of Industrial College as an opportunity, the school enterprise cooperative education mechanism is constructed. We should actively employ technical personnel from enterprises and institutions as practical training teachers to give full play to the practical expertise of such external teachers and provide strong intellectual support for the training of school talents. Employ petrochemical industry talents from the production or management front line of enterprises and institutions with rich production practice and management experience.

3.1.3 Construction of the Only Green Petrochemical Chain and Practical Engineering Practice Platform in China

With reference to the actual typical production units of five integrated bases of refining and chemical industry in Guangdong Province, Maoming Branch of Sinopec, China Science (Guangdong) refining and Chemical Co., Ltd., Sinopec Guangzhou Branch, CNOOC Huizhou Petrochemical Co., Ltd., PetroChina Guangdong petrochemical company have been deeply involved in the process. Through the whole process of green petrochemical production, including "upstream, midstream, downstream" green petrochemical industry chain engineering training content; In terms of composition, it includes oil and gas exploitation simulation center, oil and gas storage and transportation engineering virtual simulation training center, refining and chemical integration simulation training center, chemical emergency rescue training center, instrument and control training center, etc., and constructs a platform system of "engineering training, simulation and production practice" to support students' engineering practice ability training, At the same time, the functions of the platform are extended to enterprise staff skills training, school enterprise technology research and development, students' scientific and technological innovation, discipline and professional competition, etc., so as to realize the disassembly and assembly of typical devices in petrochemical enterprises, the full simulation of core production process, and the authenticity of intelligent safety production, and create the only green petrochemical full chain and realistic engineering practice platform in China. It can realize the disassembly and assembly of typical devices in petrochemical enterprises, the full simulation of core production process, and the reality of intelligent safety production. It integrates engineering experiment and practice teaching, vocational skill training, technical research and development, scientific and technological innovation, and skill competition to cultivate high-level applied and innovative petrochemical talents with professional skills, innovative consciousness, innovative ability, and international vision; Cultivate "highly qualified" teachers who are familiar with the production process and advanced equipment of enterprises and have the ability of design and innovation; Build a scientific research innovation and engineering practice platform with information training teaching and management and open service.

3.2 In Terms of Enterprise

According to the precise deployment of Guangdong provincial government, the circular system will be gradually formed to supply raw materials upstream of the industrial chain of East Guangdong and West Guangdong to deep processing enterprises downstream of the Pearl River Delta industrial chain, and the supply of fine chemical products and new chemical materials to advanced manufacturing enterprises in East and West Guangdong, and to build a belt, two wings, five bases in Guangdong Province. The layout of characteristic industries with the coordinated development of multiple parks. As an important wing of the west of Guangdong, Maoming Green Petrochemical strategic pillar industry covers a wide range of related enterprises, including Sinopec Maoming Branch, China Science (Guangdong) refining and Chemical Co., Ltd., Sinopec Guangzhou Branch, CNOOC Huizhou Petrochemical Co., Ltd., PetroChina Guangdong petrochemical company and Guangdong Xinhua Guangdong Petrochemical Group Co., Ltd.

First, the professional personnel of relevant enterprises should provide strong scientific and technological support and intellectual support for colleges and universities. It is closely related with universities and combines the actual production of the industry, and exchanges from the aspects of the extension of petrochemical industry chain, oil reduction and increase, energy saving and consumption reduction, fine chemical industry, safe production, intelligent factory and big data, etc., so as to provide valuable opinions and suggestions for the school to accurately connect with Guangdong Green Petrochemical strategic pillar industry cluster. To give suggestions for a number of science and technology innovation platforms and public service platforms to be built by the school, and to point out the direction for the school to effectively solve the technical problems restricting the Green Petrochemical Industry in Guangdong Province through the organic connection of education chain, talent chain, industrial chain and innovation chain, and strive to build a strategic pillar industrial cluster of Guangdong green petrochemical industry. It is necessary to promote Guangdong to build a new competitive advantage of Green Petrochemical Industry and cultivate new economic growth points.

Secondly, the relevant enterprises should provide the practice place of Green Petrochemical Industry Cluster for colleges and universities. Although Guangdong Institute of petroleum and chemical engineering has planned to build a platform for scientific research innovation and engineering practice, it has a long way to go from conception to completion and completion, which cannot be achieved in one step. The practice place before the platform is built has become the key link from university to enterprise connection, and the real internal environment of the enterprise can improve the quality of professional cluster application talents training.

3.3 In Terms of Local Government

Local governments should make overall arrangements and overall planning, and closely connect with local applied undergraduate universities, and effectively promote the construction of strategic pillar industrial clusters of Green Petrochemical from the aspects of organization, system and capital.

First, local governments should provide strong and strong organizational guarantee. Establish a committee of strategic pillar industrial clusters of green petrochemical, plan as a whole from macro level, formulate clear standards, standardize fund management, school enterprise cooperation, personnel recruitment and other aspects. On one hand, it provides preferential policies for enterprises that actively carry out industrial cluster work to reduce some taxes properly; On the other hand, it provides ideas and directions for colleges and universities to formulate and revise talent training programs, and ensures the implementation of school enterprise cooperation.

Secondly, the local government should provide careful and rigorous guarantee system. As the primary task, the cooperative education should be institutionalized between universities and industrial cluster enterprises, supporting laws and regulations should be formulated and improved, mobilize social forces, the key role of enterprises should be played, the maximum interests of universities and enterprises be protected, and the maximum potential of both sides be stimulated.

Thirdly, local governments should provide sufficient and effective financial guarantee. Colleges and universities need a lot of financial support to develop the talents training of strategic pillar industry cluster of green petrochemical industry. Therefore, local governments should set up special projects and fund support, and encourage universities to introduce extra campus capital through multiple channels to promote the cultivation and development of talents. Most importantly, local governments should increase the investment in talent introduction in relevant industrial clusters, give preferential treatment

to talents, and ensure that talents do not lose.

4. Conclusion

Industrial cluster is the inevitable of rapid economic development, and is the driving force of economic growth. It can optimize the integration of resources, reduce waste, comprehensively improve the advantages of regional resources, improve the economic development environment, provide more employment opportunities and solve the problems of national economy and people's livelihood. In view of the development goal of Guangdong green petrochemical strategic pillar industry cluster, we must learn from advanced education experience from abroad, explore how to solve the problem of the demand for technical and skilled talents for the rationalization of current industrial structure and transformation and upgrading. It requires the cooperation of universities, enterprises and government, and concerted efforts to build a talent training mode based on the green petrochemical strategic pillar industry cluster, strive to become the application talents and an important export base for high-level technical and management talents, and effectively meet the needs of green petrochemical industry chain.

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