

The Problems and Strategies for Curriculum Design of Regional Higher Education Based on the Needs of Strategic Emerging Industrial Cluster in Zhuhai

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Abstract

Based on the needs of emerging industry clusters in Zhuhai, this paper investigated the current situation of curriculum design in eight higher educational institutions in Zhuhai. The results showed that the distribution of relevant majors in the four emerging industrial clusters in Zhuhai was uneven, and the proportion of dual-qualified teachers needs to be increased. Practical teaching shows different characteristics in the industrial orientation. In response to these problems, the researcher proposes that universities in Zhuhai should optimize the professional layout, strengthen the construction of teaching staff, and deepen the cooperation between the school, government and enterprises based on the needs of the emerging industrial clusters in Zhuhai.

Keywords: curriculum design, higher education, Zhuhai, emerging industrial clusters

1. RESEARCH BACKGROUND

In 2020, the Zhuhai Municipal Government proposed to accelerate the development of the industrial chain, strengthen the chain, promote the construction of high-tech industrial bases, and cultivate and develop industrial clusters as a breakthrough during the "14th Five-Year Plan" period, that is, focusing on the new information technology, new energy, integrated circuit, and biomedicine and health industry so as to build a modern industrial system that supports high-quality development. Industry is an important part of regional economy and plays a central role in regional economic development because the overall development level of the regional economy is closely related to the regional industrial structure. In order to adapt to economic development, it is imperative to adjust the industrial structure. The curriculum design acts as the joint point of regional universities and the development of emerging industrial clusters in Zhuhai. It is also a bridge and link between regional universities and Zhuhai's economic development. What's more, the design of curriculum is a carrier and platform for universities to serve the needs of social development. The curriculum design of colleges and universities in Zhuhai should also meet the needs of emerging industry clusters in Zhuhai, because the progress of higher education can not only feed back the

development of the regional economy and society, but also bring good opportunities for its own development. It enables mutual achievements and mutual promotion.

2. LITERATURE REVIEW

2.1 The theory of “Triple Helix”

Henry Etzkowitz pointed out in 1995 that "the tentacles of universities and industry have begun to stretch into areas previously belonging to each other". Based on the mutually beneficial cooperation between universities, industry and government, Etzkowitz created the "Triple Helix" concept which was developed on the basis of the double helix of government-industry and university-industry. "As universities break through traditional constraints and establish new links with industry development, they devise new models to accommodate research, teaching and economic development." The concept of the triple helix came from the independent and interdependent relationship between universities, government and industry. The effective interaction of universities, industry and government promotes social innovation. According to the "triple helix" theory, the industry focuses on the development of daily production; the government focuses on promoting exchanges and communication between different subjects; as the birthplace of knowledge and technology, universities mainly promote the development of the knowledge economy. The key to the concept of "triple helix" is to promote the three parties, i.e. universities, government and industry to maintain a certain degree of independence, and to achieve effective integration and development among the three. Due to the mutual connection and mutual effective cooperation, other subjects in the spiral can be supported to generate certain innovations and form a new situation of common development. The fundamental significance of the "triple helix" concept is to promote the macro-level strategic cooperation and development of universities, governments and industries, and to achieve knowledge-based innovation-driven upgrades.

The concept of "triple helix" is an important theoretical basis for the integrated development of production and education in higher educational institutions. "Creativity comes from an open civil society. This society is between the public and private sectors, including those that serve society , i.e. organizations that act in the public interest, such as charities, NGOs, community-based organizations, professional associations , trade unions, etc. It encourages innovative activities among the three major social institutions including universities, government and industry. Negotiations and cooperation among universities, business and government provide the basis for the integration of industry and education."

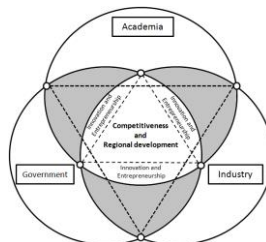


Diagram 1. "Triple helix"

2.2. Relevant literature

Jon Whittle and John Hutchinson believed that education was integrated with the development trend of the whole society, the interdependence of vocational schools and industry, and the interdependence of vocational schools and their own development. The Australian TAFE College stated that the professional setting bridged the gap between the development of colleges and universities and economic and social needs, and the impact of economic and social development on college admissions, employment and survival was affected to a certain extent. Reasonable and effective social needs are the objective basis for curriculum design and the basis for the survival and development of colleges and universities; colleges and universities should be market-oriented, adapt to social needs, revise professional settings, and scientifically adjust degree courses.

Zhao (2006) believed that colleges and universities should do sufficient research work, conduct in-depth research on industrial needs, clarify the necessary knowledge and ability structure for talent training goals, and then clearly positioned talent training goals. Huang (2019) emphasized that when colleges and universities formulated relevant professional personnel training goals, the goal was to meet the needs of the industry, and the guiding ideology was to serve social development. Xie (2007) proposed that by building a platform for communication and cooperation, the depth of production, learning and research should be combined, so as to continuously strengthen the communication between universities and related enterprises. Wang (2015) suggested using the method of field research, taking the places where China's economy developing rapidly as an example. And the research proposed that for strategic emerging industries, it was necessary to form a positive interaction among the government, enterprises and regional higher education institutions, and activate industry-university- research activities and hence realize a virtuous circle of resource utilization. Deng Zuoming made an analysis between the professional distribution of higher vocational colleges in Zhuhai and the industrial distribution of Zhuhai. Deng proposed that an information platform should be established so as to balance the supplying and demanding needs of vocational educations and human resources market. According to the objective big data, universities and colleges can adjust the professional layout to better meet the development needs of Zhuhai's industrial structure.

The existing research provides the basis and support for this paper. Therefore, based on the background of industrial demand, the research on the adjustment of curriculum design of colleges and universities still needs to be further developed, which provides the motivation for this paper.

3. THE CURRENT SITUATION AND EXISTING PROBLEMS OF CURRICULUM DESIGN IN REGIONAL COLLEGES AND UNIVERSITIES BASED ON THE NEEDS OF EMERGING INDUSTRIAL CLUSTERS IN ZHUHAI

3.1. The layout of majors of regional colleges and universities based on the needs of emerging industry clusters in Zhuhai

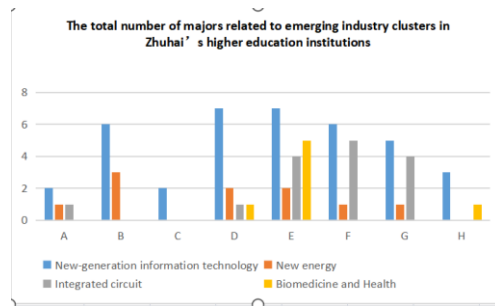


Table 1. The total number of majors related to emerging industry clusters in Zhuhai's higher education institutions

Based on the perspective of the needs of emerging industry clusters in Zhuhai, the layout of majors at eight universities or colleges in Zhuhai were investigated. From Table 1, it can be seen that the layout of majors at the 8 universities in the four emerging industries is not balanced. Among them, only two colleges and universities, namely D school and E school, have majors related to all the four industries. School C only has two majors related to the new information technology industry, but has no majors related to the other three emerging industries.

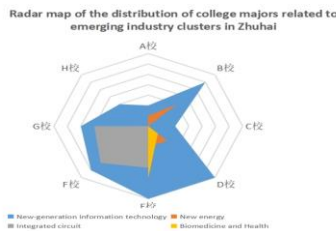


Table 2. Radar map of the distribution of college majors related to emerging industry clusters in Zhuhai

From Table 2, we can more clearly see the overall professional distribution of the eight universities in Zhuhai based on the needs of emerging industry clusters in Zhuhai. Among the four industrial groups, the new-generation information technology industry has the largest number of related majors, followed by integrated circuits, and the least are new energy industry and biomedicine and health industry. It can be seen that the distribution of relevant majors in the four industrial groups is not average.

3.2. Proportion of dual teachers

The researchers obtained data on the proportion of dual-qualified teachers in four universities in Zhuhai as follows:

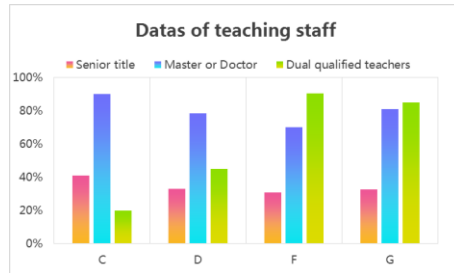


Table 3. Dats of teaching staff

It can be seen from the above data that both schools F and G are higher vocational colleges, with a relatively high proportion of dual-qualified teachers, while schools C and D are comprehensive undergraduate colleges, with a slightly lower proportion of dual-qualified teachers. Based on the development needs of Zhuhai's emerging industrial clusters, there is a relative shortage of double-qualified teachers in universities in Zhuhai.

3.3. Practical teaching situation

Practical teaching is a system based on disciplines and majors, with curriculum practice teaching as the main body, and professional practice teaching and social practice teaching as supplements. The following table shows the relevant data for the practical teaching of the four colleges obtained by the researchers:

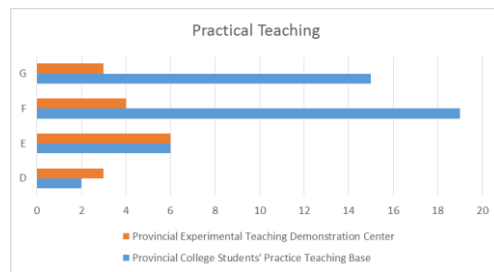


Table 4. Awards of practical teaching

In addition, the researchers also conducted an in-depth understanding of the construction of relevant industrial colleges in Zhuhai regional universities. School B established the "Artificial Intelligence Industry College" to promote the development of artificial intelligence and related industries in Zhuhai, to integrate intelligent manufacturing industry resources under the leadership of ABB Group, and to realize the linkage of research and industry innovation and development, and further enhance the comprehensive strength of Zhuhai universities. School D and two leading integrated circuit companies jointly established a modern industrial college of integrated circuit

technology, aiming to promote the development of the integrated circuit industry, in-depth enhancement of government-industry-university-research cooperation in running schools, innovating talent training models, and realizing the integration of industrial technology and achievements in the process of talent training. The connection between the discipline chain and the industrial chain promotes the deep integration of the talent supply side and the talent demand side.

On the whole, the practical teaching of the eight regional universities in Zhuhai is actively targeting one or more directions in the emerging industry clusters in Zhuhai, highlighting the cultivation of professional skills, which also reflects that the regional universities in Zhuhai are responding to regional policies and actively being integrated into regional construction and development and seeking in-depth cooperation. However, due to differences in the nature, orientation, school-running principles, school-running resources, and teaching staff of different colleges and universities, there are industrial preferences among the higher educational institutions in Zhuhai.

4. OPTIMIZING COUNTERMEASURES FOR THE CONSTRUCTION OF REGIONAL COLLEGES AND UNIVERSITIES BASED ON THE NEEDS OF EMERGING INDUSTRY CLUSTERS IN ZHUHAI

4.1 Optimize the layout of majors based on the needs of emerging industry clusters in Zhuhai

Although the eight colleges and universities involved in this research are of different natures, including ordinary undergraduates, applied undergraduates and higher vocational colleges, they should all focus on cultivating applied talents who can serve the regional economy. Universities and colleges in Zhuhai are particularly important for the economic construction of Zhuhai and the development of emerging industrial clusters in Zhuhai . Therefore, colleges and universities should follow the needs of Zhuhai's emerging industry clusters, clarify their own positioning, and make adjustments in coordination with Zhuhai's emerging industry clusters. The talent training goals of universities in Zhuhai should meet the needs of Zhuhai's economic and social development. Therefore, regional colleges and universities should fully consider the real job market in Zhuhai when setting majors, so as to match the talent supply with the market demand. According to the data analysis results in Table 1 and Table 2, the new energy industry and the biomedicine and health industry have the lowest proportion of majors in colleges and universities. In the future, it is necessary to consider adding related majors in these two industry groups.

4.2 Strengthening the teaching staff based on the needs of emerging industry clusters in Zhuhai

The deep integration of the needs of emerging industry clusters and the professional construction of regional universities will inevitably have higher requirements for the construction of teaching staff. The training of "dual-qualified" teachers with both theoretical teaching and practical teaching ability should be included in the focus of college teacher training. Therefore, universities and colleges in Zhuhai should increase their efforts to improve the training system for dual-qualified teachers, explore

cooperation with the government and enterprises, and expand the training base for dual-qualified teachers. Teachers are encouraged to actively participate in the technology research and development of enterprises related to emerging industry clusters in Zhuhai, and assist enterprises to solve bottlenecks. In addition, Zhuhai's universities and colleges can also combine external employment, flexible introduction and other measures to strengthen the communication and collaboration between full-time teachers and enterprise experts. Thirdly, Zhuhai's colleges and universities can innovate the evaluation system of "double-qualified" teachers. In the evaluation module of professional quality, the proportion of assessing technical application ability should be increased.

4.3 Deepening school-government-enterprise cooperation based on the needs of emerging industrial clusters in Zhuhai

In the adjustment process of curriculum design, Zhuhai government, regional universities and enterprises are all indispensable parts. They all play an equally important role. Only when the three parties have good interaction and adaptive development can they ultimately promote the development of emerging industrial clusters and promote the take-off of the regional economy. Zhuhai Government can provide guidance on macro policies, provide the latest development information of emerging industrial clusters, increase communication with enterprises and universities, clarify regional industrial development plans, and provide enterprises and universities with industrial development scale and trends in talent demand. data etc. In addition, the government can also promote the construction of industrial colleges, further open up the connection channels between university resources, industry leading enterprise resources and the development of emerging industrial clusters in Zhuhai, strengthen the integration of production, education and research, and deepen the all-round cooperation between schools, government and enterprises. The government should play a leading role, and enterprises should provide key technical support, share equipment and jointly build training bases for colleges and universities, and actively participate in college running and talent training, forming the advantage of centralized development. Universities and colleges, the Zhuhai government and enterprises support each other, rely on each other and promote each other, and hence build a community of integration of production and education, in order to increase the vitality of development of emerging industrial clusters in Zhuhai.

5. CONCLUSION

Based on the needs of emerging industry clusters in Zhuhai, this paper investigated the current situation of curriculum design in eight higher educational institutions in Zhuhai. The results showed that the distribution of relevant majors in the four emerging industrial clusters in Zhuhai was uneven, and the proportion of dual-qualified teachers needs to be increased. Practical teaching shows different characteristics in the industrial orientation. In response to these problems, the researcher proposes that universities in Zhuhai should optimize the professional layout, strengthen the construction of teaching staff, and deepen the cooperation between the school, government and enterprises based on the needs of the emerging industrial clusters in Zhuhai.

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