

# Study on the Enterprise Demand-oriented Industrial Internet Talent Cultivation Mode

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## ABSTRACT

The industrial Internet has been an important base stone for the fourth industrial revolution as a new thing brought about by the integrated development of the new generation of information and communication technology and modern industrial technology. To adjust to the talent demand of the emerging industrial posts in the industrial Internet, vocational colleges and universities should have a systemic reform and construction in the positioning of the talent cultivation goal, adjustment and optimization of major structure, construction of an ecological model of integration of industry and education under the relations between supply and demand, teaching mode reform, multi-party coordination of government, enterprises, universities, research institutions and consumers and so on as an important venue for the cultivation of compound talents and the main supply side of talent output. Consequently, it could empower the transformation of the traditional manufacturing industry and accelerate the digital transformation in the industry; and it would improve the shortage of industrial Internet talents. It is a trend to have cultivation of industrial Internet talents.

**Keywords:** Enterprise demand, Industrial Internet, Cultivation of talents

## 1. INTRODUCTION

As the new generation of information technologies represented by Internet of Things, big data and artificial intelligence constantly update and iterate, industrial internet has become a major trend in the world. World power are actively advancing the intelligent transformation of manufacturing industry and drafting personnel training programs. China also attaches great importance to the development of industrial internet and personnel training. Industrial internet has been included into our country's Government Work Report for three consecutive years. In 2018, General Secretary Xi Jinping stressed at the Academician Conference of the two academies that "The essence of innovation drive is talent drive, since talent is the first resource of innovation". At present, enterprises generally reflect: "The biggest challenge in the process of applying the industrial internet is not technology and capital, but talents."

As industrial internet develops rapidly, the weakness in quantity and quality of industrial internet talents turn to be the key bottleneck that hinders the development of new infrastructure related fields in Shandong Province. In order to solve the dilemma of talent shortage, it is necessary to deeply study and analyze the actual demand

and current situation of industrial internet talents, and identify the training goal and training mode of industrial internet talents based on the demand of enterprises for talents.

## 2. DEMAND OF TALENT AND THE CULTIVATION SITUATION

### 2.1. Industrial revolution and education transformation

Throughout the history of industrial development, there would be a change in labor attributes in each industrial revolution. In the first industrial revolution, the labor attribute had been transformed from the experience-oriented production to the standardized management and standardized operation, so there came the standardized and systematic vocational education. The second industrial revolution emancipated the vast labor force, so the manual workers had been eliminated gradually; thus, the vocational college transformed the operation training to be the theoretical and technical knowledge according to the enterprise demand. The third industrial revolution enabled compound talents to be a common demand for enterprises. Higher vocational

education thought highly of the cultivation of the operation talents and the talents with theoretical knowledge. The fourth revolution, i.e. the industrial Internet, replaces the labor force with machines to have production. Hence, vocational colleges and universities have a transformation from the Autonomous Learning Ability to the cross-over cooperation capacity in the cultivation of talents.

**2.2. Industry with the demand of industrial Internet talents and the scale**

With the full implementation of the strategy of making China strong in manufacturing, The Fourteenth Five-Year Plan has put forward the “industrial Internet” three times[1]. The industrial Internet has wide involvement in industries, mainly the device, communication and mechanics [2-3].

The number of domestic employees driven by the industrial Internet has greatly increased. According to the “shortest” 100 careers that employment is higher than job-hunting in the whole country in the fourth quarter of

2021 released by the Ministry of Human Resources and Social Security of the PRC in February 2022, 43 of them are the posts related to production and manufacturing. Seen from the data of the In-Depth Research and Development Trend Report of the Chinese New Generation Information Technology Industry from 2022 to 2028, the talent gap in the Chinese manufacturing industry will reach 62 million as of 2025[4].

**2.3. Situation of the cultivation of industrial Internet talent**

As of September 30, 2021, there was a total of 3012 ordinary universities and vocational colleges, including 2576 ordinary universities and vocational colleges (including 1270 universities and 1486 vocational colleges) and 256 universities and vocational colleges for adults. The schooling level of ordinary universities and vocational colleges is shown in table 1. The establishment of the majors of the industrial Internet in ordinary universities and vocational colleges is as follows:

**Table 1.** Schooling Level of Ordinary Universities and Vocational Colleges

Attribute of School	School Level	Name of School	Type of School
Ordinary Universities and Vocational Colleges	University	xx University	According to the type, the ordinary of universities and vocational colleges could be divided into: comprehensive, normal, engineering, agriculture, medicine, forestry, Chinese, finance and economics, politics and law, sports, art, nationality.
		xx College	
		xx University xx College xx Vocational University xx Vocational and Technical University	
	Vocational College		
		xx Higher Vocational College xx Vocational and Technical College xx Vocational College	

Note: The data of the table 1 comes from <http://www.moe.gov.cn>

**2.3.1. Low proportion of the majors related to industrial Internet**

According to the sorting statistics of the 744 vocational majors in the Major Catalogue of Vocational Education (2021) printed by the Ministry of Education, there are only two similar majors, industrial Internet technology and application of industrial Internet. The majors related to industrial Internet are the five major categories: equipment manufacturing, electronics and information, energy, power and materials, resources, environment and safety, and transportation and 38 majors include the application of artificial intelligence technology and intelligent Internet technology. The number of the vocational majors on the industrial Internet (including the 2 similar ones) accounts for 5.3% of the sum of the vocational majors.

**2.3.2. Wide coverage of the undergraduate majors related to industrial Internet**

According to the sorting statistics of the 771 undergraduate majors in the Major Catalogue for Undergraduate of Ordinary University and College (2021) issued by the Ministry of Education, there is no major on the industrial Internet. The undergraduate majors related to the industrial Internet are covered with three major categories: engineering, science and management and 51 majors including intelligent manufacturing engineering, intelligent equipment and system, and industrial intelligence. There is only industrial Internet engineering and industrial Internet technology in the Major Catalogue for Undergraduate of Vocational College and University (2021). The number of undergraduate majors related to the industrial Internet accounts for 6.6% of the sum of the undergraduate majors.

### **3. CHANCES AND CHALLENGES OF ORDINARY HIGHER EDUCATION**

The industrial Internet is the necessary path for the industrial upgrading of the Chinese manufacturing industry. Consequently, there is also a development chance for higher education. On one hand, there are extremely scarce talents for the industry related to the industrial Internet. Under the influence of policy dividends and other factors, the Chinese industrial industry accelerates its development to provide highly skilled jobs for the compound talents who master industrialization and informatization skills, and it also drives the significant increase of the domestic employees. On the other hand, the development of industry pushes close cooperation between government, enterprises and schools. The government and enterprises would increase the capital investment in education to build up “industrial colleges” and “future colleges” with colleges and universities so as to build up a new mode of talent cultivation.

### **4. REFORM OF ENTERPRISE DEMAND-ORIENTED TALENT CULTIVATION MODE**

#### ***4.1. Position talent cultivation goal***

The talent cultivation demand change under the background of industrial Internet and intelligent manufacturing could be divided into three links: equipment link, product link and value link. The equipment link means to need the devices in the equipment intellectualization, equipment networking, equipment digitization, equipment automation and equipment life cycle; product link means to need design and product-oriented talents in the product optimization, product design, process optimization, production planning, process monitoring; value link means to need economic and management talents in the sales order, production plan, raw materials and supply, intelligent manufacturing, completion and delivery, sales and distribution, financial accounting. The positioning and goal of talents cultivation are confirmed according to the selection and employment standards of enterprise posts. Focus on the industrial Internet and comply with multiple key engineering majors, so as to set a new engineering talent cultivation system with complex engineering and management, interdisciplinary and up-down connections so as to cultivate the applied, compound and innovative industrial Internet talents.

#### ***4.2. Explore the setting of emerging majors with the interdisciplinary integration***

Along with the profound development of the Internet application, the upgrading of the manufacturing industry and the rapid development of mobile communication, big

data technology roars out. Internet technology could have a full release of the potential and create much more value if it is integrated into the industrial field. In the face of the new situation of the COVID-19 and new challenges, the industrial Internet plays a significantly positive role since it has been widely applied to production and manufacturing, material distribution, engineering construction, medical treatment, epidemic prevention and control and many other scenes. With the industrial Internet technology and industrial Internet engineering majors as a construction prototype, it reshapes a reticular structure specialty applicable for the interdisciplinary integration to form the new interdisciplinary majors of the medical and engineering, engineering and engineering and engineering and management.

#### ***4.3. Study the buildup of the ecological system with the integration of industry and education***

During the 14th Five-Year Plan, there should be a huge development space for the integration of industry and education. Especially for innovating schooling modes, deepening integration of industry and education, cooperation of schools and enterprises and encouraging enterprises to hold high-quality vocational-technical education, our country has issued relevant supportive policies. According to the features of the interdisciplinary integration, it is built with a talent cultivation mechanism with the project as the link, task-centered scientific research and teaching cooperation mechanism and resources distribution mechanism with the orientation of interdisciplinary integration, so as to form an interdisciplinary “long-term mechanism for industry and education”. The interdisciplinary management committee with the participation of multiple parties of enterprises, universities and research institutions should be established to take responsibility for connection and communication between all disciplines and workplaces, so as to form an interdisciplinary mechanism with multi-party cooperation, coordination and linkage, mutual benefit and win-win results to provide much more facilities for colleges and universities to have the cultivation of compound and new talents.

#### ***4.4. Carry out the reform of supply-side’s talent cultivation mode***

It is found from the literature review that the grey GM (1,1) prediction mode is the common mode for the prediction of the demand for scientific and technological talents. In addition, it is also predicted with Neural Networks, regression models and other methods in other studies[5]. The influencing factors of the demand for industrial Internet talents are very complicated, and the long-term prediction method and grey prediction model could be introduced as a prediction combination. According to Maslow’s hierarchical theory of needs, the high-end talents would care more about “respect and self-

worth” and other high-level needs. To further implement the strategic measures suggested by Made in China 2025, the reform of the talent suppliers for making China strong in manufacturing should be deepened with the demand for national strategies as goal guidance. Firstly, have a reform in the cultivation mode to implement the special plan of talent cultivation with the integration of industry and education; secondly, have a reform in the curriculum system with a focus on the shaping of the interdisciplinary talents with one specialty and multiple abilities. Thirdly, have a reform in the cultivation parts and focus on the shaping of the knowledge application ability and the innovation ability; finally, have innovation on the mechanism of the integration of industry and education and build up long-term cooperation platform for schools and enterprises, so as to achieve the dynamic adjustment between the supply and demand with the team as a link. It would serve for the local economic development and the talent cultivation to achieve the two-way connectivity between enterprises and schools, the profound integration of industry and education and the cultivation of multi-field, multi-dimensional and multi-level compound talents.

#### ***4.5. The innovative thinking mode with the multi-party coordination of industry and enterprise demand***

Build up an innovative and coordinative mechanism of government, enterprises, universities, research institutions and consumers for the industry and the enterprise demand. Open up an innovative path with the coordination of “government, enterprises, universities, research institutions and consumers”. With the orientation of the industrial Internet enterprise demand and the center of the talent cultivation, build up a win-win mode of enterprise cooperation with the innovation of multiple participants to mine the schooling features of colleges and universities, to display the incentives and guidance of policy, so as to push the scientific and technological innovation and achievement transformation in colleges and universities and to deepen the integration of industry and education, which would encourage colleges and universities to pursue intensive development. Colleges and universities would have active docking and integration with the external scientific and research departments and develop the cooperation space with governments to improve the cooperation quality; build up “internal and external recycle” of the service. With the “internal and external recycle” of the science and technology service as a carrier, explore the construction of an industrial Internet college. In the operation of an industrial Internet college, all experts in governments, industries, enterprises and scientific research institutes could formulate the talent cultivation schemes with colleges and universities, so as to have a close combination between the major construction and industrial development; thus, the curriculum contents

could match the professional standards, teaching process and engineering process, a training platform and enterprise environment. Build up an integrated ecological system with the multi-party coordination of government, enterprises, universities, research institutions and consumers.

## **5. CONCLUSION**

On all these counts, on the one hand, the research on the training mode of industrial internet talents aims to accelerate the training of industrial internet talents, deepen the integration of production and education, and advance the structural reform of talent supply side, so as to form the coordinated development of industry and talents. On the other hand, it also aims to promote the formulation of talent standards for industrial internet-related posts, solve the structural contradictions of industrial internet talents, thus providing policy reference and theoretical basis for the integration of production and education in industrial internet. In view of the fact that personnel training is a systematic and long-term project, it requires us to clarify the internal data logic among industrial chain, talent chain and professional chain, and formulate practical training objectives according to the characteristics of colleges and universities, so as to achieve accurate docking between schools and enterprises and accurately educate people, what’s more, Industrial internet talents can better serve the upgrading and long-term development of enterprises in the future.

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