Research on Talent Training of Information Technology Category in Secondary Vocational Schools under the Background of Digital Economy: A Case Study of Tianjin

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Abstract. The training of information technology talents needs to match the development needs of the digital economy. This article takes Tianjin as an example to explore the matching degree between the talent training of information technology category in secondary vocational schools and the development of the information industry from three aspects: scale, structure, and quality and efficiency. Research has shown that the teacher-student ratio in information technology category in secondary vocational schools in Tianjin is relatively low, and the proportion of graduates who obtained professional qualification certificates in information technology category in secondary vocational schools in Tianjin is also low, and indicating a downward trend in quality and efficiency.

Keywords: Digital economy, Information technology, Secondary vocational education, Talent training, Matching degree

1 Introduction

In recent years, with the continuous innovation and development of Internet, artificial intelligence and other information technologies, digital economy has become the theme of the new era [1]. In 2022, the scale of China's digital economy reached 50.2 trillion yuan, ranking second in the world and accounting for 41.5% of GDP.

The development of the Information and Communication Technologies (ICT) industry and the evolution of its ecosystem cannot be separated from talents. According to the "China ICT Talent Ecology White Paper" jointly released by Ernst&Young (China) Enterprise Consulting Co., Ltd. and Huawei Technology Co., Ltd. in November 2022, it is predicted that by 2025, the shortage of ICT talent in China will exceed 20 million, and the overall supply and demand gap will continue to expand. The shortage of talent in emerging technologies such as cloud computing, big data, the Internet of Things, artificial intelligence, and 5G is prominent.

At present, the domestic and foreign scholars have conducted extensive research on the relationship between the digital economy and the labor market [2-5]. Based on these research foundations, this article will take the talent training of information technology

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category in secondary vocational schools as the research object, take Tianjin as an example, from actual data, analyze the matching degree between the talent training of information technology category in secondary vocational schools and the development of the information industry in Tianjin under the background of regional digital economy, and then propose relevant suggestions.

2 Analysis Framework of Matching Degree

In previous related studies, based on the research of relevant experts and scholars, the author mainly explored the coordination and matching degree between vocational education and regional economic and social development from three aspects: scale, structure, and quality and efficiency [6,7]. At present, China's information technology industry is growing at a super high growth rate. At the same time, in China's secondary vocational education, information technology category is the largest major category in terms of student size, and Tianjin's performance in this area is basically consistent with that of China. Next, this article will take the information technology category of secondary vocational schools in Tianjin as an example, and continue to conduct a matching analysis from the above three aspects, namely, analyzing the matching degree between the scale of secondary vocational education in the major category and the scale of the industry, analyzing the matching degree between the professional structure of secondary vocational education in the major category and the industrial structure, and analyzing the matching degree between the quality and efficiency of secondary vocational education in the major category and the regional economic and social development, The specific analysis framework of the matching degree is shown in Figure 1.

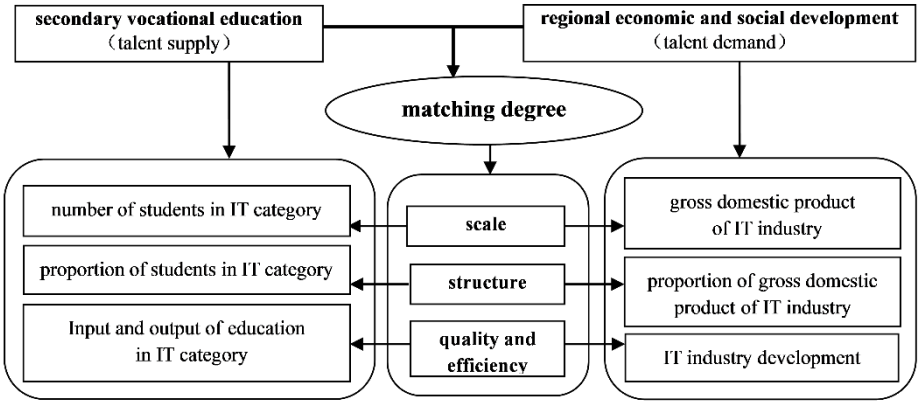

Fig. 1. Framework diagram for analyzing the matching degree

3 Analysis on Matching Degree of Scale

According to the Tianjin Statistical Yearbook and the China Statistical Yearbook, the gross domestic products of information transmitting, software and information technology services industry from 2012 to 2021 are shown in Table 1.

Table 1. GDP of Information transmitting, software and information technology services industry from 2012 to 2021

Unit:100 million yuan

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	average growth rate
Tianjin	176.61	196.14	220.49	268.23	378.52	498.13	627.57	475.74	554.23	571.97	13.95%
China	11928.7	13729.7	15939.6	17516.8	20124.1	23808.9	28733.5	33391.8	38244.1	44510.4	15.76%

Based on the data released by the Tianjin Education Yearbook and the Development and Planning Department of the Ministry of Education from 2013 to 2022, Figure 2 and Figure 3 are drawn.

In the past decade, the gross domestic product of information transmitting, software and information technology services in Tianjin has been growing positively, and the growth rate is relatively fast; The student scale of information technology category in secondary vocational schools in Tianjin has a negative growth. There is a certain mismatch between the above two. However, further in-depth research has found that the decline in the student scale of information technology category is mainly affected by the decline in overall student scale in secondary vocational schools in Tianjin, and compared to the national level and overall level of Tianjin, the range of the decrease in the student scale of information technology category in secondary vocational schools in Tianjin is the smallest. This preliminary indicates that compared to other major categories and the national level, Tianjin attaches great importance to the cultivation scale of students in information technology category. Meanwhile, the matching degree of structure should be analyzed to obtain further conclusions.

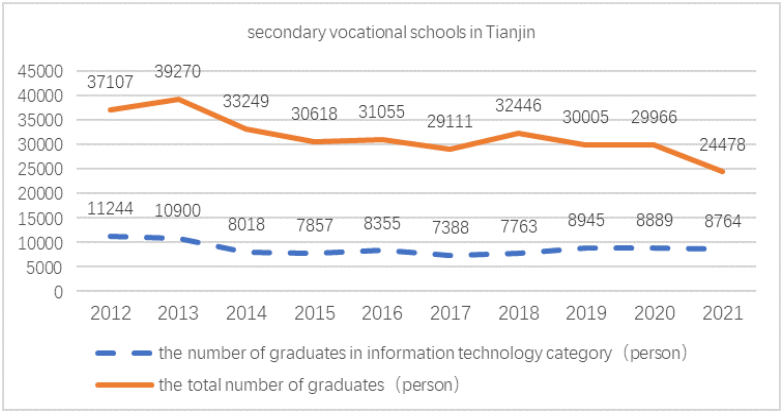

Fig. 2. Number of graduates in secondary vocational schools in Tianjin from 2012 to 2021

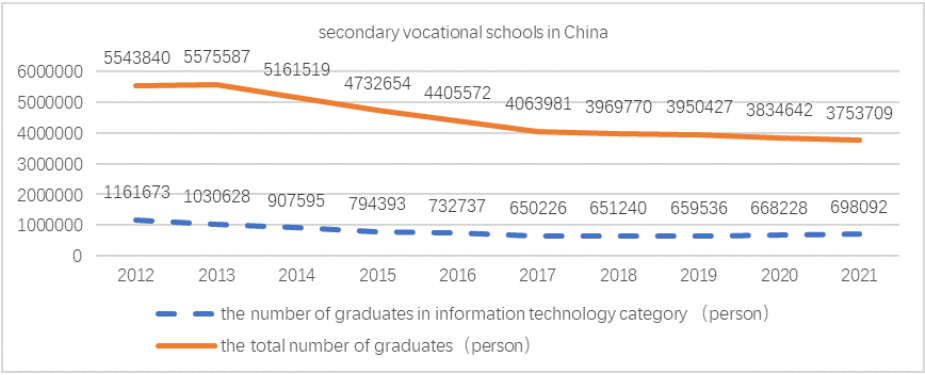

Fig. 3. Number of graduates in secondary vocational schools in China from 2012 to 2021

4 Analysis on Matching Degree of Structure

This article measures the matching degree of structure, mainly by comparing the proportion of the number of graduates in information technology category to the total number of graduates in secondary vocational schools and the proportion of the GDP of IT industry to regional GDP [8,9].

Based on the statistical data released by the Tianjin Statistical Yearbook, Tianjin Education Yearbook, China Statistical Yearbook, and the Development Planning Department of the Ministry of Education from 2013 to 2022, the matching degrees of structure from 2012 to 2021 are calculated. As are shown in Tables 2 and 3.

Table 2. Matching degree of structure in Tianjin from 2012 to 2021

year	Tianjin					
	number of graduates in IT category（person）	total number of graduates（person）	proportion of graduates	GDP of IT Industry（100 million yuan）	GDP（100 million yuan）	proportion of GDP
2012	11244	37107	30.3%	176.61	12893.88	1.37%
2013	10900	39270	27.8%	196.14	14442.01	1.36%
2014	8018	33249	24.1%	220.49	15726.93	1.40%
2015	7857	30618	25.7%	268.23	16538.19	1.62%
2016	8355	31055	26.9%	378.52	17885.39	2.12%
2017	7388	29111	25.4%	498.13	18549.19	2.69%
2018	7763	32446	23.9%	627.57	18809.64	3.34%
2019	8945	30005	29.8%	475.74	14104.28	3.37%
2020	8889	29966	29.7%	554.23	14083.73	3.94%
2021	8764	24478	35.8%	571.97	15695.05	3.64%

Table 3. Matching degree of structure in China from 2012 to 2021

year	China					
	number of graduates in IT category（person）	Total number of graduates（person）	proportion of graduates	GDP of IT Industry（100 million yuan）	GDP（100 million yuan）	proportion of GDP
2012	1161673	5543840	21.0%	11928.7	540367.4	2.21%
2013	1030628	5575587	18.5%	13729.7	595244.4	2.31%
2014	907595	5161519	17.6%	15939.6	643974	2.48%
2015	794393	4732654	16.8%	17516.8	689052.1	2.54%
2016	732737	4405572	16.6%	20124.1	744127.2	2.70%
2017	650226	4063981	16.0%	23808.9	832035.9	2.86%
2018	651240	3969770	16.4%	28733.5	919281.1	3.13%
2019	659536	3950427	16.7%	33391.8	986515.2	3.38%
2020	668228	3834642	17.4%	38244.1	1013567.0	3.77%
2021	698092	3753709	18.6%	44510.4	1149237.0	3.87%

From Tables 2 and 3, if the proportion of the GDP of IT industry to regional GDP is used as the output indicator, and the proportion of the number of graduates in IT category to the total number of graduates in secondary vocational schools is used as the input indicator, then while the output is basically equivalent, compared with the overall level of China, Tianjin's investment in the talent training in information technology category in secondary vocational schools is relatively high, which may have certain problems with the input-output ratio. Therefore, the matching degree of quality and efficiency should be analyzed to obtain further conclusions.

5 Analysis on Matching Degree of Quality and Efficiency

"Teacher-student ratio " and "proportion of graduates who have obtained vocational qualification certificates" were often used to reflect the matching degree of quality and

efficiency. Calculated from the education statistical data released by the Development and Planning Department of the Ministry of Education and the Tianjin Education Yearbook from 2013 to 2022, the specific results are shown in Figures 4 and 5.

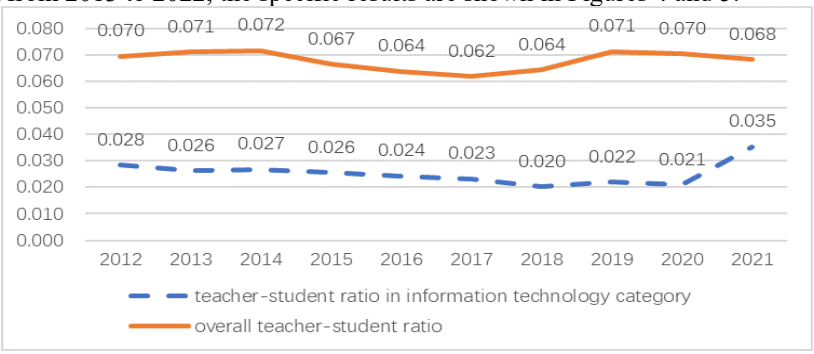

Fig. 4. Teacher-student ratio in secondary vocational schools in Tianjin from 2012 to 2021

According to Figure 4, the teacher-student ratio in information technology category is significantly lower than the overall teacher-student ratio in secondary vocational schools in Tianjin. In addition, it is found that, since 2017, the proportion of graduates who obtained professional qualification certificates in information technology category in secondary vocational schools in Tianjin has been declining year by year, and all of them are lower than the national level, as is shown in Figure 5.

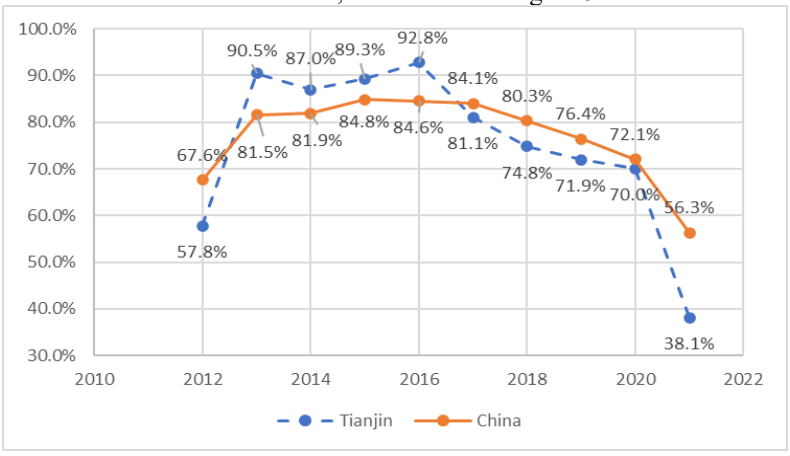

Fig. 5. Proportion of graduates who obtained professional qualification certificates in information technology category in secondary vocational schools from 2012 to 2021

6 Conclusions

Through the analysis of the three aspects of matching degree of scale, structure, and quality and efficiency in the talent training in information technology category in secondary vocational schools in Tianjin, it is found that, firstly, the decline in the student

scale of information technology category is mainly affected by the decline in overall student scale in secondary vocational schools in Tianjin, and compared to the national level and overall level of Tianjin, the decline range in the student scale of information technology category in secondary vocational schools in Tianjin is relatively low; Secondly, compared with the level of China, the proportion of graduates in information technology category in secondary vocational schools in Tianjin is relatively high, which means that without considering the overall student scale in secondary vocational schools, Tianjin still has a relatively high level in quantitative terms on the talent training in information technology category in secondary vocational schools; Finally, the teacher-student ratio in information technology category in secondary vocational schools in Tianjin is relatively low, and the proportion of graduates who obtained professional qualification certificates in information technology category in secondary vocational schools in Tianjin is also low, and showing a declining trend year by year. This requires great attention in the field of secondary vocational education in Tianjin to promote its high-quality development [10].

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