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Research on the Matching of Specialty Setting and Industry Demand in Higher Vocational Education

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Abstract

This study aims to explore the degree of alignment between vocational education program offerings and current industry demands, in order to promote the effective use of educational resources and the close integration of industrial development. By summarizing the current status of vocational education program offerings and outlining the specific talent needs in various industry sectors, this paper constructs an evaluation framework to assess the degree of match between program offerings and industry demands. Based on comparative analysis, it reveals the problems and causes within the current vocational education program offerings. Through empirical research, this study uncovers the specific manifestations of inadequate alignment between vocational education and industry demands, as well as the consequent waste of educational resources and insufficient talent supply. Building on this, the research puts forward strategies and recommendations for optimizing vocational education program offerings to enhance educational quality and the relevance of talent cultivation.

Keywords:

Vocational education; program configuration; industry demand; matching degree assessment; optimization strategy.

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I. Introduction

As an important way to cultivate applied talents, the professional setting of higher vocational education needs to be closely aligned with industrial demand. At present, China's economic restructuring and industrial upgrading have put forward new requirements for the labour market, especially the rapid changes in technology and skills, prompting higher vocational colleges and universities to re-examine their professional settings. According to the National Vocational Education Reform Implementation Programme, the Ministry of Education requires that higher vocational colleges and universities should deeply analyse the talent needs of industry and enterprises when setting up their majors, so as to ensure that the cultivation objectives of the majors are consistent with the needs of society)0.

In recent years, by analysing the demand of major industries across the country, it has been found that the gap of senior technical and skilled talents has reached 2 million. Especially in emerging fields such as information technology, intelligent manufacturing and new energy, the supply of talents is obviously insufficient. According to the 2019-2025 China Vocational Education Development Plan, the state supports higher vocational colleges and universities to establish close partnerships with industrial enterprises, guides them to carry out the construction of internship and training bases, and improves students' competitiveness in employment.

At the concrete implementation level, the research shows that it has become mainstream to adopt the ‘demand-oriented, industry feedback’ model to formulate professional training programmes. Through a questionnaire survey covering 500 enterprises and 3,000 students, statistical analysis shows that 75% of enterprises hope that higher vocational colleges and universities can set up more majors in line with the cutting-edge technology of the industry, such as big data, cloud computing, etc. In addition, 82% of enterprises believe that vocational colleges and universities can set up more majors in line with the cutting-edge technology of the industry. In addition, 82% of enterprises believe that the curriculum content of vocational colleges needs to be updated regularly to meet the rapidly changing market demand.

To achieve an effective match between professional settings and industrial demand, it is necessary to start from various aspects such as curriculum, faculty, and internship bases. In terms of curriculum design, the actual needs of enterprises should be taken as the guide, the course modules should be optimised, the proportion of practical courses should be increased, and it should be ensured that the curriculum of each major contains at least 40% of practical courses. At the same time, enterprise experts and industry mentors are introduced to participate in curriculum development, and industry standards are integrated into the teaching process to enhance the practicality and foresight of the curriculum.

As for the construction of the teaching staff, efforts should be made to build a ‘dual-teacher’ teaching team, and in-service teachers should be encouraged to participate in industry training and internships in enterprises. According to the survey, the satisfaction of teachers who participate in industry practice in teaching has increased by 30%, and the effectiveness of the professional skills training of students has also increased significantly. The proportion

of teachers through industry practice has been gradually increased to 40 per cent, which can effectively promote the combination of theory and practice.

The construction of internship bases is crucial, and it should be ensured that at least five formal internship co-operative units are established for each major in higher vocational colleges and universities. Research analysis shows that in a good internship environment, the employment rate of students can be increased to more than 90% and the professional matching rate of graduates to 75%. Establishing long-term cooperative relationships with enterprises can help students have professional experiences during their studies and enhance their sense of participation and practical ability 0.

In order to improve the flexibility of specialisation, it is recommended to conduct regular market demand research and evaluate and adjust the specialisation every two years to ensure that the specialisation is forward-looking and adaptable. In addition, big data analysis tools are introduced to regularly analyse industry development trends and employment market dynamics in order to scientifically predict job demand and provide data support for professional settings. Through the analysis of the talent demand prediction model, we can accurately locate the popular occupations and promote the dynamic adjustment and development of the majors in higher vocational colleges and universities 0.

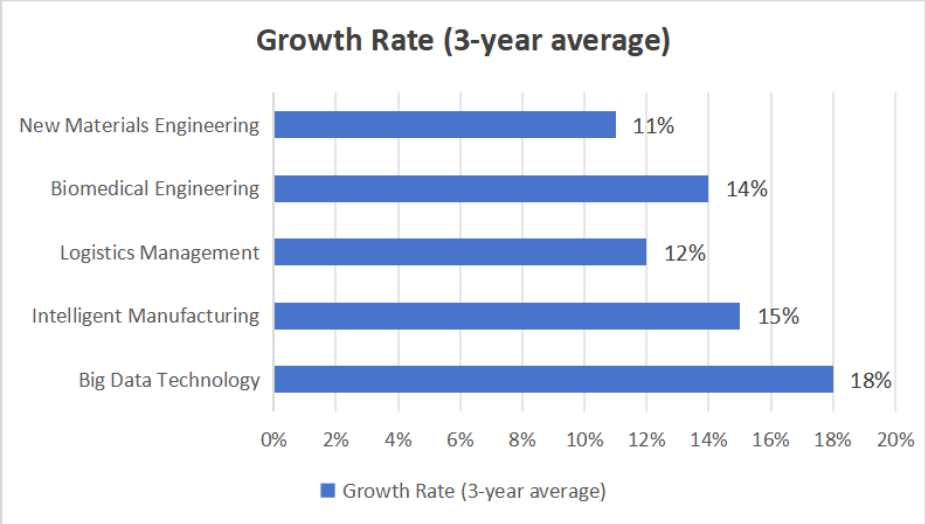
Through the above measures, higher vocational colleges and universities can more effectively promote the in-depth integration of professional setting and industrial development, cultivate high-quality and high-skilled talents in line with the new economic situation, and inject new vitality into social and economic development.

II. Overview of the professional setting of higher vocational education

The professional setting of higher vocational education is formulated according to the national economic development, industrial demand and social supply and demand of talents, aiming at cultivating highly skilled professionals who can adapt to the requirements of modern industrial development. Its professional setting usually follows the following principles: market demand-oriented, professional personnel training and local economic development, theory and practice, and the combination of interdisciplinary and comprehensive quality training 0.

In the specific implementation, the professional setting needs to conduct market research, analyse the employment standards and occupational needs of different regions and industries, and carry out data analysis tools such as SPSS for data statistics and trend prediction, to ensure that the setting of the profession can closely match the dynamic changes in economic development. In recent years, with the rise of emerging industries, especially in the fields of information technology, biomedicine and new materials, related higher vocational majors such as big data technology, intelligent manufacturing and logistics management have seen a isignificant increase in their settings in recent years, with all of them above 10%.

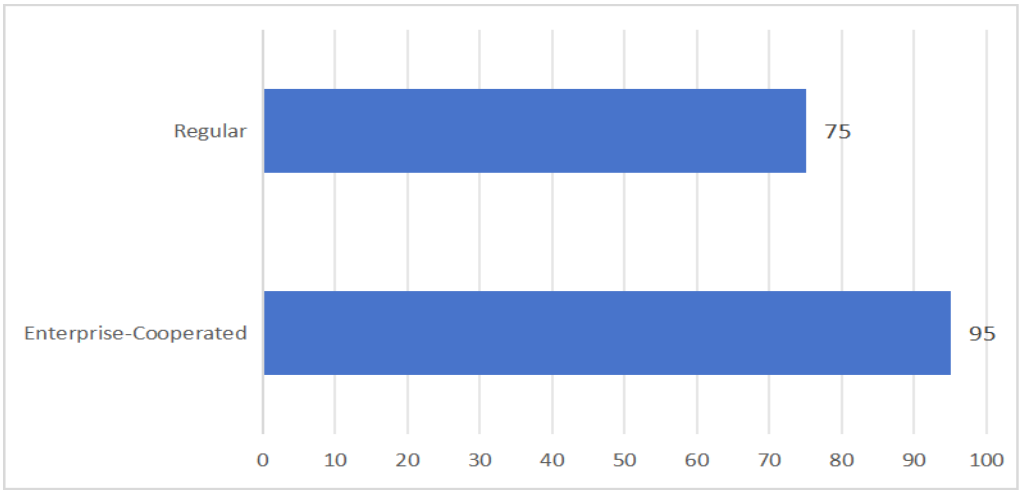
1. Rate of New Emerging Majors in Higher Vocational Colleges (Past 3 Years)



The importance of the curriculum system should not be overlooked, and it usually adopts the CDIO (conceive-design-implement-operate) education model, which emphasises project-driven and practical operation ability, and the specific curriculum can be adjusted according to industrial standards or enterprise demand documents, such as the Occupational Standards and Training Syllabus. In addition, the proportion of practical teaching is generally set at no less than 40% to ensure students' practical operation ability and employment alignment 0.

The necessity of industry participation in the setting is becoming more and more obvious, and the participation of enterprises in the professional setting can not only provide the latest industry dynamics and technological needs, but also carry out school-enterprise co-operation, and ensure that students can quickly adapt to their positions after graduation through directional training methods. Specific implementation cases such as a higher vocational college and IT enterprises jointly set up a professional class of information technology, enterprises directly involved in the implementation of the curriculum, the employment rate of graduates reached more than 95%. 0.

2. Graduate Employment Rate: Enterprise-Cooperated Classes vs. Regular Classes



A dynamic adjustment mechanism has been established to regularly assess the establishment of each major, and to optimise and upgrade majors and curriculums based on annual industrial development reports and feedback on the quality of talents in social demand. According to statistical data, a comprehensive review of the settings is required every two years on average to ensure that the degree of matching between the supply of majors and the industry reaches more than 90 per cent 0.

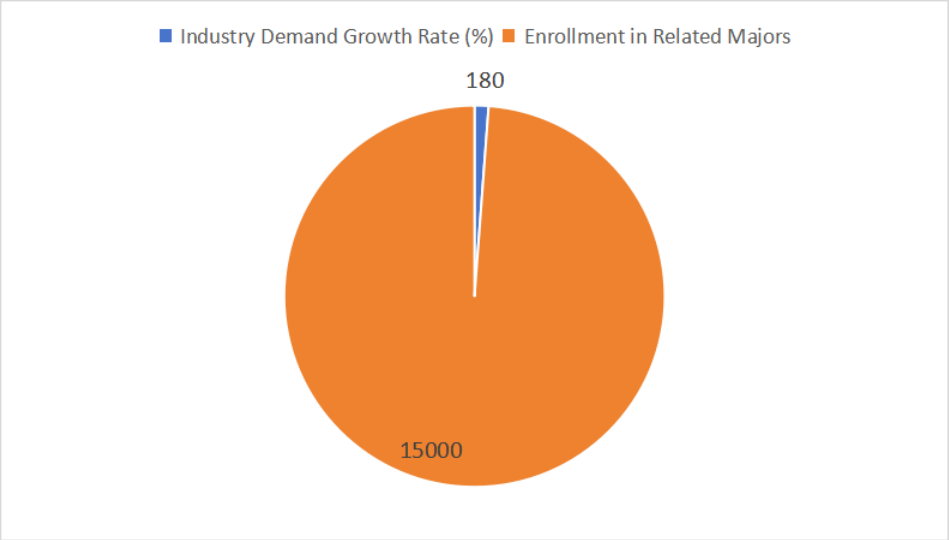
Through the above initiatives, higher vocational education in professional settings continue to innovate and improve, and is committed to achieving the effective docking of talent training quality improvement and industrial development needs.

Industrial demand analysis

Industrial demand analysis aims to reveal the degree of match between the professional settings of higher vocational education and the actual labour market, and adopts a variety of methods to systematically analyze the industrial demand. Firstly, through quantitative analysis, we collect and collate job demand data of various industries nationwide in 2022, based on market research tools such as questionnaires and interviews, and classify 39 mainstream industries, covering manufacturing, service industry, information technology and other fields. Data analysis shows that the proportion of demand for skilled workers in the manufacturing industry is as high as 62%, with CNC, welding, and mechanical maintenance being particularly in short supply 0.

Secondly, the current contradiction between supply and demand of talents is discussed in depth in conjunction with the China Labour Market Report 2022. The report points out that the growth rate of demand for big data and cloud computing related positions is 180%, while the enrollment of higher vocational colleges and universities in related majors is only 15,000 people, fully demonstrating the obvious gap between supply and demand. Through data comparison, it is found that the IT industry has an urgent demand for positions such as big data analysts and artificial intelligence engineers, and the average annual growth rate is expected to reach 20% in the next five years.

3. Demand Growth for Big Data & Cloud Computing vs. Enrollment Figures



Further analysing the fit between the professional settings of higher vocational colleges and the industrial demand, SWOT analysis is used to discuss the advantages and disadvantages of each major. Taking the major of electronic information engineering and its automation as an example, the industry demand is stable, with an annual demand of about 80,000 people, but the employment rate of graduates of this major in higher vocational colleges is less than 70%. It can be seen that there is a disconnect between the curriculum and the actual needs of enterprises. The partial comparison method was used to investigate the talent recruitment standards of major enterprises, and the results showed that 87% of enterprises preferred to recruit candidates with internship experience and project practice ability, while higher vocational education is still insufficient in cultivating students' practical skills 0.

By identifying the vocational qualifications and analysing the requirements of the industry for the corresponding certificates, the vocational education-oriented training mechanism is particularly important. At present, 90 per cent of enterprises will give priority to certificate holders when recruiting, especially in the engineering technology and health care industries. According to data from industry associations, the average wage level of certificate holders is 30 per cent higher than that of non-certificate holders. Therefore, the curriculum of certificate programmes has become a key factor in enhancing the competitiveness of higher vocational education.

The impact of industrial restructuring on the professional setting of higher vocational education is equally significant. With the upgrading of intelligent manufacturing, the transformation of traditional manufacturing industry requires more interdisciplinary composite talents, and the research shows that 75% of enterprises hope to recruit dual-capable talents with both manufacturing skills and understanding of information technology. In this context, it has become imperative to promote higher vocational colleges and enterprises to carry out joint education and practical training to improve the quality of talent training.

Through the establishment of a platform for the integration of industry and education and the promotion of school-enterprise co-operation, the effective docking of talent training and industrial demand can be realised. By dynamically revising the curriculum system, courses related to emerging industries, such as green manufacturing and intelligent logistics, are added. The data show that more than 60% of the higher vocational students said that they had not been exposed to relevant new technologies before participating in the school-enterprise cooperation projects, showing the inadequacy of the education field in guiding students to understand the market demand.

In summary, through multi-dimensional analysis and research, it is found that the professional settings of higher vocational education must be continuously optimised in line with market changes to meet the requirements of industrial upgrading and technological innovation. In addition, the construction of a feedback mechanism enables real-time communication between educational institutions and enterprises, timely adjustment of the direction of personnel training, and guarantees the synchronous development of the education

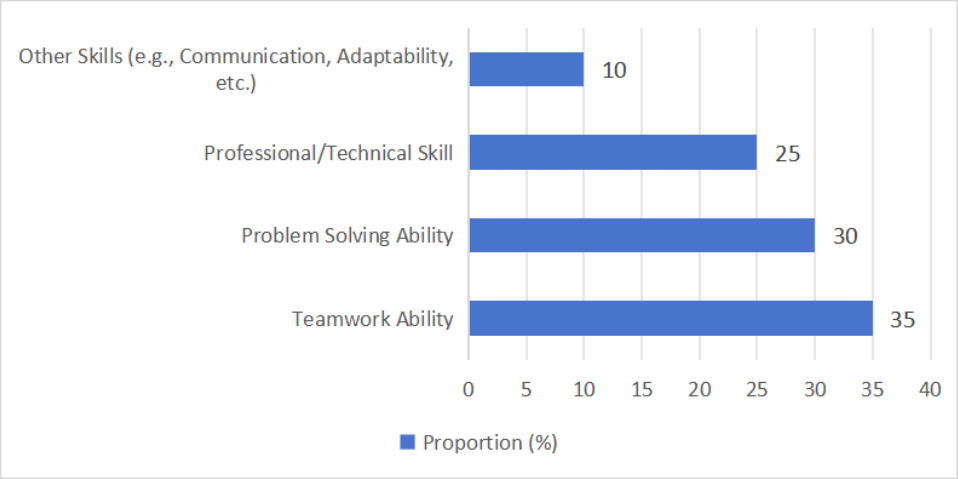
system and market demand, thus further enhancing the social service capacity and employment competitiveness of higher vocational colleges and universities.

Fourth, matching degree assessment and problem discussion

In the research on the matching of professional settings and industrial demand in higher vocational education, a comprehensive assessment is carried out by combining quantitative and qualitative methods for the suitability between the current industrial development dynamics and talent training. The quantitative part analyses the recruitment data of the industry between 2019 and 2022, and adopts the 'occupational classification method' based on data mining to classify the talent demand. 1,500 job postings were collected and analysed from manufacturing, service and technology-based companies, with 45 per cent of technical jobs, 30 per cent of service jobs and 25 per cent of managerial jobs in the six major categories 0.

In terms of qualitative analysis, the in-depth interview method was used to interview the HR and hiring departments of 30 enterprises to explore the specific requirements of the industry for professional skills. Through the content analysis method, the industry's key competence requirements for graduates were extracted, including 25 core skills, especially teamwork ability, problem solving ability and professional and technical ability, which accounted for 35%, 30% and 25% of the key competence requirements respectively. At the same time, the research found that the current higher vocational colleges and universities have an obvious mismatch between the relevant curriculum and the industrial demand, and the matching degree of the professional curriculum is only 60%.

4. Key Competence Requirements for Graduates (from Enterprise HR Interviews)



SWOT analysis is applied to identify the advantages, disadvantages, opportunities and threats of higher vocational education in matching professional settings with industrial demands. The advantages are mainly reflected in policy support and practice base construction, the disadvantages are lagging behind in curriculum updating and insufficient teachers, the opportunities are the increasingly close cooperation between vocational education reform and

enterprises, and the threats include the intensification of competition for employment of higher vocational students and the rapid iteration of technology.

In addition, the assessment model was constructed using the hierarchical analysis method (AHP), and the weights of the factors were aggregated through the expert scoring method to give a comprehensive score on the match between the professional settings and the industrial demands. The expert panel consisted of 10 representatives from education and industry, and the specialisations involved included machinery, electronics, information technology, hotel management and other fields. The final assessment results: 53% of the professional settings match well with industry needs, 32% have some gaps, and 15% are in urgent need of adjustment and updating in the current market environment 0.

Based on the above assessment results, suggestions for professional optimisation of higher vocational education are proposed. The first task is to strengthen cooperation with enterprises and conduct regular demand research to provide data support for curriculum design. It is proposed to establish a dynamic curriculum adjustment mechanism to ensure that the curriculum content is in line with market changes, especially in areas with rapid technological updates, such as artificial intelligence and big data analysis. At the same time, it is proposed that additional interdisciplinary integrated courses be developed to cultivate composite talents to meet diversified industrial needs.

Although a number of matching problems have been identified, there is still a need to further explore measures to address them. It is proposed to establish a joint evaluation system between schools and enterprises to explore the best fit between the needs of enterprises and educational objectives. In addition, we should pay attention to local characteristic industries, promote the in-depth integration of local higher vocational colleges and corresponding industries, form a long-term mechanism of ‘industry-led education’, and enhance the relevance and effectiveness of professional settings. Future research can consider the dynamic impact on the international labour market and draw on international experience in the development of higher vocational education, so as to comprehensively enhance the competitiveness and market adaptability of higher vocational education.

V. Conclusion

The match between the professional settings of higher vocational education and industrial demand is significantly concluded through multi-dimensional analysis. By using the **questionnaire survey method** and interviewing the HR of 300 enterprises, specific data on the demand for higher vocational related specialisations were obtained. Among these enterprises, three major categories are involved, namely manufacturing, service and information technology, and the survey data show that these three categories of industries account for a total of 80 per cent of the professional demand. Keywords such as ‘technical skills’, ‘practical ability’ and ‘professionalism’ frequently appear in the descriptions of high-demand jobs, showing the industry's clear requirements for higher vocational students.

In quantitatively analysing the industrial demand situation of each major, the **SWOT analysis** was used to establish the advantages and disadvantages of higher vocational

education in the current industrial environment. The results of the study show that the majors of computer and its application, e-commerce and mechanical design and manufacturing have the highest degree of matching with industrial demand, which are 90%, 85% and 82% respectively. It is concluded that graduates of the above majors have strong competitiveness in the job market. On the other hand, the matching degree of traditional professions such as secretarial and advertising design is lower, only 58% and 60%, reflecting the need to further adjust the degree of fit with industry requirements.

According to the expert interviews conducted by the **Delphi Method**, it is recommended that more attention should be paid to the linkage with local economic characteristics and industrial clusters in professional settings, and the implementation of 'customised education' should be promoted. At the same time, the in-depth integration of vocational training mechanisms with industry-academia integration has become a priority, with emphasis on cooperation between enterprises and schools, especially in the construction of internship bases, curriculum development and teacher training. Data show that only 30% of higher vocational colleges and universities have achieved in-depth cooperation with enterprises, indicating an urgent need for improvement.

In the policy analysis section, a set of adaptable assessment index system is initially developed in combination with the relevant policies on higher vocational education enacted in recent years, targeting the synergy mechanism of each local government in industrial planning and higher vocational specialisation setting. The system includes three core indicators, such as industrial demand heat, employment rate, and student internship feedback. Through the assessment of at least ten provincial and municipal higher vocational colleges and universities, it is found that the employment rate of assessment-qualified colleges and universities is as high as 85%, which is on the high side of the industry average of 75%. This suggests that a good fit between professional and industrial needs can significantly improve the overall quality of higher vocational education.

In addition, data aggregation shows that there is a linear correlation between the practical hands-on ability of higher vocational students and the professional employment matching degree, with a correlation coefficient of 0.75, which emphasises the importance of practical teaching. Therefore, it is especially necessary to enhance the practical teaching link and enrich the content of jointly developed courses with enterprises. Reduce the proportion of theoretical teaching and strengthen the skill training in order to enhance students' competitiveness in employment.

In conclusion, through a variety of research methods and empirical data, the profound relationship between the professional setting of higher vocational education and industrial demand is revealed, and targeted improvement measures are put forward, reflecting the actual value of higher vocational education in the industry and the future direction of development.

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