Advances in Vocational and Technical Education (2025)
Clausius Scientific Press, Canada

DOI: 10.23977/avte.2025.070210
ISSN 2523-5834 Vol. 7 Num. 2

The Necessity and Significance of Guangdong Higher Vocational Education in the Development of AI

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Keywords: Artificial Intelligence, Precise Talent Supply, Dynamic Coupling Mechanism, Cross-Border Integrated Talents, Digital Twin Model, Industry-Education Integration

Abstract: This study examines the talent supply challenges faced by Guangdong's higher vocational education in the context of AI and robotics industry development. It aims to establish a "demand-supply" dynamic coupling mechanism to achieve highly aligned supply and demand.. By using diverse approaches, it proposes dynamic demand prediction models and policy tools, offering theoretical and practical guidance for talent supply in Guangdong higher vocational education. The results indicate that Guangdong higher vocational education needs to shift to a "precise adaptation" model, establish a dynamic response mechanism, and cultivate cross-border integrated talents. Future research will concentrate on the "digital twin" model of AI and vocational education systems, promoting the sharing of vocational education resources in the Guangdong - Hong Kong - Macao Greater Bay Area.

1. Introduction

1.1 Research Background

Against the backdrop of rapid global technological advancement, AI has emerged as a driving force for industrial transformation, permeating various industries and reshaping industrial and employment landscapes. With geographical, economic, and innovation advantages, Guangdong Province is at the forefront of China's intelligent industry development. In recent years, the province's intelligent industry has grown in scale and innovation capacity, with widespread application of technological achievements in production, driving industrial upgrading towards high - end and intelligent development.[1]

However, despite the thriving intelligent industry in Guangdong, higher vocational education faces significant challenges in talent supply. Vocational colleges' slow - to - adjust programs, underdeveloped emerging majors, and outdated curricula fail to meet enterprises' demand for new-skill talents. Educational resources are unevenly distributed. The Pearl River Delta has concentrated high - quality vocational education resources. In contrast, eastern, western, and northern Guangdong suffer from insufficient per - student funding, outdated teaching facilities, and weak teacher resources. This leads to inconsistent talent - cultivation quality that's disconnected

from industrial demands, creating a "supply - demand gap"[2].

In this context, policy - makers are highly concerned. The “Guangdong New - Generation Artificial Intelligence Development Plan”sets industrial growth targets, which require a large number of high - quality technical and skilled talents. Deepening "industry - education integration" and optimizing the higher vocational talent supply system have become key tasks for industrial upgrading and educational reform in Guangdong. Building a vocational education system connected to industrial demands and achieving resonance between talent cultivation and industrial development are urgent issues to be resolved.

1.2 Problem Statement

This study focuses on the precise talent supply challenges in Guangdong’s higher vocational education within the AI and robotics sectors.. It aims to build a "demand - supply" dynamic coupling mechanism, enabling vocational colleges to quickly sense industrial demand changes and adjust talent training programs accurately for highly matched supply and demand. Existing studies have limitations, primarily focusing on macro-level policies while inadequately addressing Guangdong’s regional characteristics. For instance, the Pearl River Delta has developed industrial clusters with high demand for high - end technical and skilled talents, while eastern, western, and northern Guangdong have lagging industries and scarce vocational education resources.[3]Also, there’s a lack of precise industrial demand prediction models. Without grasping industrial trends, it’s hard to provide a scientific basis for vocational education program and curriculum reform. In policy tools research, there’s a lack of operable and implementable measures, leading to poor policy effects.[4]

Thus, this study aims to fill these gaps by analyzing Guangdong’s industrial and regional characteristics, building a dynamic demand prediction model, and proposing feasible policy tools. It will offer theoretical and practical guidance for precise talent supply in Guangdong higher vocational education.

2. Literature Review of "AI +" Higher Vocational Education

2.1 International Experiences and Theoretical Foundations

Germany’s "dual-system" vocational education model emphasizes deep enterprise-school cooperation. Students receive practical training in enterprises and theoretical teaching in schools, closely integrating theory and practice. This enhances the quality of talent cultivation and aligns vocational education more closely with industrial demands.[5] For example, Zhejiang Jiaotong introduces this model to train precision processing talents. The school and enterprise jointly develop intelligent manufacturing curricula, with students highly involved in real - enterprise projects, making graduates well - received by enterprises.

The dynamic capability theory, proposed by American scholar David Teece, suggests that organizations need "sensing - capturing - restructuring" capabilities to respond to technological and market changes. In vocational education, it implies that the vocational education system should establish a dynamic response mechanism to industrial demands. It should sense new industrial trends and demands, seize technological - change opportunities, and restructure talent - cultivation modes and curricula. For instance, facing the rapid development of AI and robotics technologies, vocational schools should adjust programs and curricula promptly to cultivate students’ emerging - technology skills for industrial upgrading.

2.2 Domestic Research Progress

China’s industry - education integration policies have made some progress. For example, the Ministry of Education’s "On - site Engineer Special Training Program" has achieved phased results. However, in Guangdong, the low proportion of vocational school teachers’ enterprise practice leads to teaching - content disconnection from enterprise demands, affecting industry - education integration and talent - cultivation quality.[6]

In regional adaptability research, most studies focus on the Yangtze River Delta, with less systematic analysis on the coordinated development of intelligent industrial clusters and vocational education systems in Guangdong. Guangdong’s complex industrial structure and rapid intelligent - industry development contrast with the large regional differences in industrial characteristics and vocational education resources. The Pearl River Delta has developed industrial clusters and abundant educational resources, while eastern, western, and northern Guangdong have lagging industries and scarce vocational education resources, failing to meet talent demands.[2] In - depth research on Guangdong’s regional industrial and vocational education resource characteristics and exploration of suitable industry - education integration modes hold vital practical significance.

3. Research Necessity

3.1 Theoretical Necessity

Current theories of vocational education talent cultivation lack a systematic evaluation index system for "industry demand-vocational education supply" coupling. They can’t accurately measure the matching degree between the two. The evaluation index system constructed in this study covers multiple dimensions, comprehensively assessing the matching degree of vocational education and industrial demands. [4]It identifies that some Guangdong vocational colleges’ intelligent - manufacturing curricula are disconnected from industrial demands, indicating the direction for vocational education reform.

The "cross - border integrated talent" three - dimensional ability model proposed in this study emphasizes the integration of technological fusion, cross - disciplinary thinking, and lifelong learning abilities. Industrial demands for talents have shifted from single - discipline knowledge and skills to cross - disciplinary composite talents. [7]For example, a Guangdong intelligent - manufacturing enterprise requires R & D engineers with multi - disciplinary knowledge integration and innovation. The model deepens the understanding of vocational education talent - cultivation goals, offering a theoretical basis for cultivating high - quality talents meeting industrial demands.

3.2 Practical Necessity

As an economic powerhouse, Guangdong’s accelerated industrial upgrading, driven by intelligent manufacturing pilot projects, has transformed industrial intelligence. However, enterprises urgently need composite technical talents. Vocational colleges’ slow curriculum updates and poor school - enterprise cooperation fail to meet demands, restricting enterprise development and industrial upgrading.[4]This study explores building a "demand - supply" dynamic coupling mechanism to promote timely program and curriculum adjustments in vocational colleges, strengthen school - enterprise cooperation, improve talent - cultivation quality, and achieve better interaction between vocational education and industries. It holds vital practical value for meeting industrial - upgrade talent demands and reducing enterprise labor costs.

3.3 Policy Necessity

This research aligns with national strategies and optimizes resource allocation. The "China Education Modernization 2035" plan stresses deepening industry - education integration, and Guangdong's "manufacturing - led" strategy requires numerous high - quality technical and skilled talents. By building a "demand - supply" dynamic coupling mechanism, this research promotes precise vocational - education supply - and - demand alignment, offering talent support for Guangdong's strategy.[1]

Guangdong's uneven educational - resource distribution features abundant resources in the Pearl River Delta and scarcity in eastern, western, and northern Guangdong. This research helps optimize Guangdong's educational - resource allocation by encouraging Pearl River Delta vocational colleges to support those in eastern, western, and northern Guangdong. It shares quality resources, narrows regional gaps, improves talent - cultivation quality in eastern, western, and northern Guangdong, and promotes regional economic coordination.

4. Research Significance

4.1 Theoretical Significance

This research is innovatively and expansively valuable in theory. On the one hand, it explores the concept of building a "digital twin" prediction model based on IoT, big data, AI, etc.[6] It monitors and predicts industrial demands, offering a scientific basis for vocational education program and curriculum reform. On the other hand, it extracts the "Guangdong model" of intelligent industrial clusters and vocational education system collaborative development. This model highlights government - enterprise - school collaboration through establishing industrial colleges, jointly building training bases, and conducting order - based training. It offers a reference for other provinces, enriching theoretical research on vocational education and industrial collaborative development.

4.2 Practical Significance

In education, this research promotes curriculum and teaching material digital transformation, developing "AI +" modular curricula for quality student learning resources.[8] In industry, it optimizes talent supply, cuts enterprise training costs, boosts technological innovation, ensures talent precision alignment, and promotes product upgrading. In policy - making, it provides scientific evidence and suggestions, such as setting up vocational - education special funds to improve teaching facilities, enhance teacher quality, build training bases, and promote balanced regional vocational - education resource allocation, offering talent support for Guangdong's industrial upgrade.

4.3 Social Significance

This research holds social significance by optimizing talent supply and promoting vocational education - industry integration. It trains numerous high - skilled talents meeting industrial demands, creating more job opportunities for graduates and promoting regional economic growth. The "skills competition + enterprise certification" model offers students a skill - display platform, enhancing their employability, reversing social vocational - education bias, and boosting its social standing.[7]

5. Research Methods and Technical Route

To ensure the research is scientific, comprehensive, and in-depth, this study employs multiple methods. Literature metrology uses Citespace to analyze "AI +" vocational - education literature over a decade, mapping knowledge graphs and identifying research hotspots and trends. [1]Policy text mining applies NLP to analyze policy documents like the "Guangdong New - Generation Artificial Intelligence Development Plan" to uncover core themes and policy directions. Empirical surveys conduct questionnaires among intelligent enterprises and vocational colleges, analyzing data with SEM and AMOS to verify assumptions and reveal the intrinsic relationship between industrial demand and vocational - education supply.

The research follows a "theoretical analysis - data collection and analysis - model construction and verification - policy proposals" logic. In theoretical analysis, related theories and research results are sort out to clarify research foundations and gaps. In data collection and analysis, data are collected and analyzed using literature metrology, policy text mining, and empirical surveys. In model construction and verification, a "demand - supply" dynamic (Figure 1) coupling mechanism model and a "digital twin-prediction model" are built and optimized. In policy proposals, targeted suggestions are made based on research results and Guangdong's actual situation.

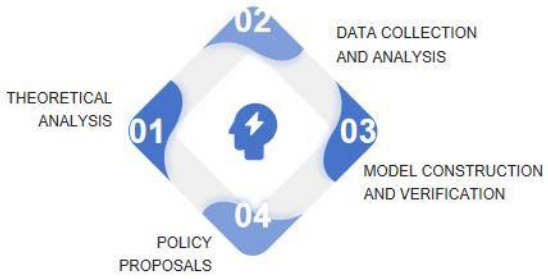

Figure 1: Research Model

6. Conclusions and Future Research

This research suggests that Guangdong higher vocational education should shift from traditional models to "precise adaptation." Building a "demand - supply" dynamic response mechanism enables vocational education to quickly sense and precisely align with industrial demands. Adjusting programs meets industrial talent demands. Cross - border integrated talent cultivation is vital for industrial - upgrade. The "technology + management + innovation" three - dimensional ability model offers a theoretical framework. Through school - enterprise collaboration and other measures, precise talent supply can be achieved. Students gain comprehensive abilities to adapt to enterprise work.

Future research can expand theoretically and practically. Theoretically, it can deeply explore the "digital twin" model of AI and vocational education systems for real - time industrial - demand and vocational - education - supply linkage. Practically, it can promote Guangdong - Hong Kong - Macao Greater Bay Area vocational - education resource sharing by establishing regional vocational - education alliances, conducting cross - border cooperative education, and jointly building training bases. This trains high - quality technical and skilled talents for the Greater Bay Area's intelligent - industry development.

Acknowledgements

Special Innovation Project of Guangdong Provincial Ordinary Higher Education Institutions:

Research on the Development of Artificial Intelligence and the Precise Supply of Talents in Higher Vocational Education in Guangdong Province (Project No.: 2024WTSCX249)

References

[1] People's Government of Guangdong Province. Development Plan for the New Generation of Artificial Intelligence in Guangdong Province [RR]. Guangzhou: People's Government of Guangdong Province, 2020.
[2] Guangdong Provincial Institute of Education Research. Study Report on the Adaptability between Talent Supply in Guangdong Higher Vocational Education and Intelligent Industry Demand [RR]. Guangzhou: Guangdong Provincial Institute of Education Research, 2023.
[3] Chen Yan, Zhang Liyue. The Coupling Logic and Collaborative Path between Intelligent Industrial Clusters and Vocational Education Specialty Clusters [JJ]. Vocational and Technical Education, 2022, 43(10): 36-41.
[4] China Electronics and Information Industry Development Research Institute. Report on the Development of Talent in China's Artificial Intelligence Industry (2023-2024) [RR]. Beijing: CCID Consulting, 2024.
[5] Liu Xingfeng, Hu Changsong, Qin An. A Study on the Connotative Characteristics and Implementation Path of Digital Transformation in Guangdong Higher Vocational Education under the "Double High Plan" Background [JJ]. Journal of Shunde Polytechnic, 2023, 21(3): 6-13.
[6] Li Ming. "Artificial Intelligence +" Empowering Higher Education: Theoretical Logic, Practical Dilemmas, and Implementation Paths [JJ]. Thought Unicorn, 2024(12): 1-15.
[7] Lu Yan, Gui Lincui. Analysis of the Impact of Artificial Intelligence Technology on Employment and Income in China [JJ]. Bulletin of the Chinese Academy of Sciences, 2025, 40(4): 642-651.
[8] Hu Junjie, Yang Mengting. Exploration of Talent Training Models for Tourism Management Majors in the Era of Artificial Intelligence: Based on a Survey of Undergraduate Institutions in Guangdong Province [JJ]. Innovative Education Research, 2024, 12(3): 1-10.