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Research on the Demand and Current Situation of Digital Talent Training in China's Higher Vocational Colleges in the Digital Economy Era

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Abstract

Amid rapid global digital economy growth, China's economy is swiftly advancing toward digitalization, networking, and intelligence, reshaping industries and talent cultivation. Higher vocational colleges play a crucial role in providing skilled, digitally literate, and innovative talent. Drawing on literature and field research, this paper examines the current state of digital talent training, industry-driven demand, and existing gaps. It proposes strategies for curriculum reform, faculty development, industry–education integration, resource building, and international cooperation. While progress has been made, shortcomings remain in aligning curricula with industry needs, enhancing teachers' skills, and strengthening collaboration, requiring a multidimensional approach to meet evolving labor demands.

Keywords: digital economy, higher vocational colleges, digital talent, talent cultivation, vocational education

1. Introduction

Since the 21st century, the digital economy has emerged as a new engine of economic growth, driving global economic transformation at an unprecedented pace. According to the China Digital Economy Development White Paper (2024) released by the China Academy of Information and Communications Technology, the scale of China's digital economy reached RMB 54.6 trillion in 2023, accounting for over 42% of GDP. The digital economy is not only a competitive arena for Internet enterprises but is also penetrating deeply into traditional industries such as manufacturing, agriculture, and services, giving rise to new industrial forms such as intelligent manufacturing, smart agriculture, digital finance, and smart cities. This trend has directly led to a surge in labor market demand for digital talent, covering areas such as big data analytics, artificial intelligence applications, cloud computing operations, and IoT development.Within China's higher education system, higher vocational education—known for its focus on cultivating applied and skilled talents—has become an indispensable force in the development of the digital economy. Higher vocational colleges have unique advantages in training technical talents for frontline production, service, and management positions. However, in the face of the rapidly evolving demands of the digital economy, traditional talent training models in higher vocational colleges reveal insufficient adaptability in curriculum systems, practical platforms, and faculty development. The accelerating pace of industrial transformation not only requires students to master solid professional skills but also to possess cross-disciplinary digital capabilities, data-driven thinking, and an innovative mindset.Therefore, an in-depth study of the demand and current situation of digital talent cultivation in China's higher vocational colleges in the digital economy era will not only help optimize the structure of vocational education and improve training quality but also provide solid talent support for industrial digital transformation, thereby achieving a virtuous cycle of education serving economic and social development.

2. Talent Training Requirements in the Digital Economy Era

2.1 Characteristics and Development Trends of the Digital Economy

The digital economy is an economic form in which data serve as a key production factor, modern information networks as the main carrier, and the deep application of information and communication technologies as the driving force. Its core characteristics include data-driven development, cross-sector integration, platform ecosystems, intelligence-led growth, and green sustainability. With the rapid adoption of emerging technologies such as 5G, artificial intelligence, blockchain, and the Internet of Things, the industrial boundaries of the digital economy are continuously expanding—from Internet industries to manufacturing, agriculture, energy, transportation, healthcare, and beyond. The International Monetary Fund (IMF) predicts that by 2030, the digital economy will account for more than 60% of global GDP.In China, the 14th Five-Year Plan clearly states the goal to "accelerate digital development and build a digital China," assigning the digital economy the strategic mission of driving high-quality economic growth. This means that future industrial upgrading and economic growth will depend heavily on a large number of digitally skilled talents, including both high-end R&D professionals and a substantial workforce of highly skilled applied talents capable of flexibly using digital technologies on the frontline. The educational objectives of higher vocational colleges are thus highly aligned with the development direction of the digital economy, and the effectiveness of talent training will directly influence the efficiency of industrial transformation.

2.2 Talent Competency Model in the Context of Digital Transformation

In the digital economy, enterprises' requirements for talent competencies have shifted from single skills to composite capabilities. Based on the findings of this study, the digital talent competency model should encompass the following dimensions:Digital technology application ability: including data collection, analysis, and visualization; operation of cloud computing platforms[1]; configuration and maintenance of IoT devices.Cross-disciplinary knowledge integration ability: the capacity to integrate digital technologies with expertise in one's own field, such as combining mechanical engineering with data analytics in intelligent manufacturing.Digital communication and collaboration ability: familiarity with online collaboration tools and the ability to work efficiently in virtual team environments. Innovation and problem-solving ability: the capacity to propose innovative solutions based on data insights to address real business problems.Digital ethics and security awareness: understanding of laws, regulations, and professional norms regarding data privacy protection and cybersecurity.This model applies not only to the IT industry but also to all traditional industries undergoing digital transformation, such as manufacturing, logistics, finance, and healthcare[2].

2.3 Changes in Enterprises' Skill Requirements for Higher Vocational Digital Talent

Survey results indicate that compared to five years ago, the most significant change in enterprises' recruitment of higher vocational graduates is the markedly increased emphasis on digital skills. On the one hand, enterprises expect new hires to be able to use digital tools and platforms immediately upon onboarding, thereby reducing training costs. On the other hand, the growing need for cross-departmental collaboration in digital projects makes enterprises favor talents with cross-disciplinary understanding. In addition, with the trend toward green and low-carbon transformation, digital skills have extended into areas such as energy-saving management and environmental monitoring, requiring talents not only to operate technology but also to assess its environmental impact[3].

3. Current Situation of Digital Talent Training in China's Higher Vocational Colleges

3.1 Progress in Building Digital Education Systems

In recent years, higher vocational colleges in China have made positive progress in building digital education systems. The Action Plan for Improving the Quality and Excellence of Vocational Education (2020–2023) issued by the Ministry of Education explicitly calls for accelerating the construction of information-based teaching resources and promoting the deep integration of digital technology with professional education. Most higher vocational colleges have incorporated digital content into their specialized courses—for example, adding intelligent manufacturing training modules in mechatronics, financial information system operation training in accounting, and smart tourism platform operations in tourism management[4].As the table 1 shown, Survey data show that more than 70% of higher vocational colleges nationwide have built online course platforms, 65% have introduced virtual simulation training systems, and 52% have launched cross-disciplinary digital elective courses. However, development remains uneven across regions and institutions, with economically developed areas significantly ahead of underdeveloped central and western regions in terms of informatization[5].

Table 1. Digital Course Offerings and Proportion in Higher Vocational Colleges in Selected Provinces and Cities in China

Province/City	Total Number of Colleges	Colleges Offering Digital Courses	Proportion (%)	Average Proportion of Digital Courses (%)
Beijing	38	36	94.7	42.5
Shanghai	30	28	93.3	40.2
Guangdong	92	85	92.4	38.7
Zhejiang	60	54	90.0	37.9
Sichuan	75	62	82.7	33.4
Gansu	23	15	65.2	28.1
Qinghai	9	5	55.6	25.6

3.2 Curriculum Systems and Integration of Digital Skills

From the perspective of curriculum design, the proportion of digital skills content in specialized courses in higher vocational colleges has steadily increased. For example, automotive testing and maintenance programs have widely introduced connected vehicle diagnostics, construction engineering programs have integrated Building Information Modeling (BIM) software instruction, and marketing programs have added e-commerce data analysis courses. However, in some institutions, the offering of digital courses remains limited to tool operation, lacking project-based teaching linked to real industry scenarios. As a result, students' acquired skills often cannot be directly matched with job requirements upon graduation[6].

3.3 Digital Literacy of Faculty Teams

Faculty quality is a critical factor influencing talent training outcomes. While the overall digital literacy of teachers in higher vocational colleges has improved, a polarization phenomenon exists. Some teachers actively participate in enterprise digital projects and can introduce cutting-edge technologies into the classroom, whereas others, constrained by limited training opportunities and heavy workloads, lag behind in mastering new technologies, leading to outdated teaching content. The survey found that only about 35% of specialized course teachers possess strong data analysis skills and cross-platform development experience[7].

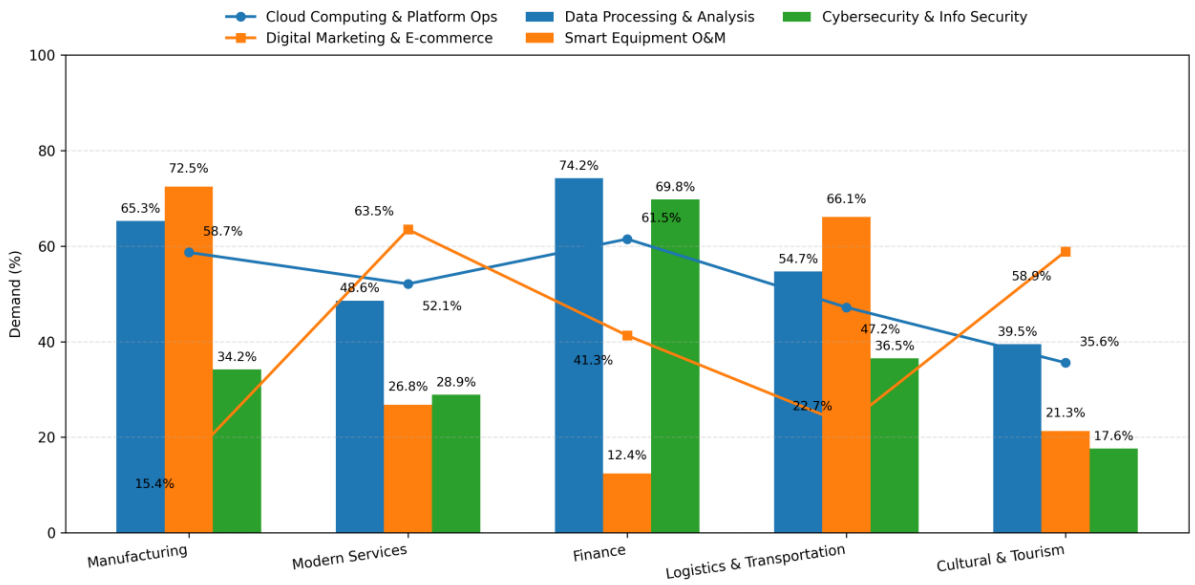

Figure 1. Demand for Digital Talent Skills in Higher Vocational Graduates by Industry (%)

4. Analysis of Digital Talent Demand and Gaps

4.1 Talent Demand Structure in Industry Digital Transformation

As the digital economy permeates all sectors, the structure of demand for digital talent has become increasingly diversified. In traditional manufacturing, the introduction of industrial Internet platforms has sharply increased the

need for technicians capable of equipment networking, data collection, and data analysis. In the modern service sector, the digital transformation process requires large numbers of personnel skilled in the use of customer relationship management (CRM) systems, e-commerce platforms, and online marketing tools. The financial industry, by contrast, demands composite talents who are both familiar with financial operations and proficient in big data analysis and financial technology (FinTech) applications. Overall, industrial upgrading is driving a shift in skill requirements from "single-technology" talent toward an integrated model of "technology + data + business."As the figure 1 shown, based on surveys of 30 enterprises conducted for this study, companies generally expect higher vocational graduates to be able to operate digital tools proficiently from the very start of employment and to possess a certain degree of cross-disciplinary collaboration ability, enabling them to quickly integrate into project teams. This trend requires the curriculum design, training platforms, and industry–education integration mechanisms of higher vocational colleges to align more closely with industrial frontiers[8].

4.2 Matching Between Digital Competencies of Higher Vocational Graduates and Enterprise Needs

Although the proportion of digital courses in higher vocational colleges has increased in recent years, survey findings reveal that graduates' digital competencies do not yet align well with enterprise needs. Manufacturing companies report that some graduates remain at a theoretical level in equipment networking and data analysis, lacking practical experience. Modern service enterprises note that while graduates can perform basic operations with e-commerce analytics tools, they lack a deep understanding of the business logic behind the data. Financial enterprises widely report deficiencies in graduates' cybersecurity awareness and risk prevention capabilities.From a quantitative perspective, this study's questionnaire compared graduates' self-assessed mastery of digital skills with employers' assessments. Results show that graduates' self-assessed mastery averaged 78.6%, whereas employers rated it at only 62.3%, with the largest gaps in comprehensive application and cross-disciplinary integration abilities[9].

4.3 Types and Causes of Demand Gaps

Drawing on questionnaires, in-depth interviews, and enterprise talent demand analyses, this study finds that the gaps between digital talent cultivation in higher vocational colleges and actual industry needs manifest primarily in three areas.The first is skill-level gaps. While most graduates possess some ability to use digital tools, they remain largely confined to basic operations and classroom exercises, lacking depth in core technologies such as big data analytics, AI algorithm applications, and cloud platform operations—making it difficult to meet enterprises' immediate needs for composite digital skills.The second is application scenario gaps. There is a noticeable disconnect between curricula and industry frontiers. Some colleges rely on outdated teaching cases and insufficiently realistic scenarios, leaving students ill-prepared to respond flexibly to complex and changing work tasks.The third is soft skills and overall competence gaps. Enterprises often report that some graduates perform poorly in cross-department communication, project collaboration, and problem-solving, while also lacking digital ethics and data security awareness—factors that undermine trust and stability in digital project roles.The causes of these gaps are both external and internal. Externally, the rapid iteration of digital economy technologies and ever-rising skill requirements outpace updates in educational content, resulting in a "time lag" between graduates' capabilities and the technologies used in enterprises. Internally, some colleges adjust curricula infrequently and lack dynamic optimization mechanisms based on industry research. Moreover, faculty often have limited enterprise experience, digital training coverage is narrow, and cutting-edge technologies are not effectively translated into teaching resources. In addition, insufficient depth in industry–education integration and the lack of long-term, practice-based cooperative projects reduce students' opportunities to gain real work experience while in school, creating a cycle of "insufficient capability output—higher enterprise training costs—lower talent matching[10].

5. Optimization Paths for Digital Talent Cultivation in Higher Vocational Colleges

5.1 Improving the Digital Curriculum System and Professional Structure

In the context of the digital economy, optimizing the curriculum system and professional structure of higher vocational colleges is the primary step to improving the quality of digital talent cultivation. First, guided by the needs of industrial digital transformation, colleges should establish a three-tier system of "basic digital literacy courses – core professional courses – cross-disciplinary integration courses."Public foundation courses should introduce content such as data analysis and visualization, information security fundamentals, and the use of digital collaboration tools to ensure all students acquire essential digital competencies. In core professional courses, modules on AI, cloud computing, blockchain, and IoT should be deeply integrated with existing professional knowledge—for example, incorporating smart warehousing and supply chain big data analysis into logistics management, and adding industrial Internet platform operations and smart equipment diagnostics to mechatronics.

Cross-disciplinary integration courses should promote teaching that combines digitalization with industries such as finance, manufacturing, tourism, and healthcare to cultivate composite-skilled talents.Second, the professional structure should be dynamically adjusted based on industry research and employment data, adding emerging digital economy–related majors (e.g., digital design and manufacturing, smart finance technology, digital cultural tourism management) while phasing out majors disconnected from industry needs or with persistently low employment rates—forming an "optimize in, phase out" structure.Third, curriculum content should be made project-based and scenario-driven, using real enterprise cases and simulation platforms to integrate digital skills training with industrial workflows, so students accumulate practice directly convertible into job capabilities.Finally, a joint course development mechanism with enterprises should be established, inviting industry experts to participate in curriculum standard setting and teaching, embedding the latest industrial technologies and application trends into the teaching process, thus shortening the time gap between education and industry needs.

5.2 Building a Composite "Dual-Qualified" Faculty Team

In the digital economy era, building a composite "dual-qualified" faculty team—possessing both solid theoretical knowledge and rich industry experience—is key to improving the quality of digital talent cultivation in higher vocational colleges.First, clear standards for "dual-qualified" teachers should be established, requiring not only mastery of core professional knowledge but also proficiency in relevant digital technology applications such as data analytics, smart equipment operation, and cloud platform management, and the ability to integrate these technologies into classroom teaching and practice guidance.Second, a diversified teacher development mechanism should be created, combining "on-campus training + enterprise practice + professional certification" to enhance faculty competencies. On campus, digital teaching and research training centers should be established to conduct regular training in emerging technologies. Off campus, teachers should be regularly assigned to partner enterprises and industrial parks for temporary positions or real project participation to accumulate first-hand industry experience.In recruitment and mobility, colleges should increase the hiring of part-time teachers and technical experts from industry, attracting engineers and project managers with practical digital backgrounds to participate in teaching, ensuring that content remains aligned with industry developments. Core faculty should also be encouraged to participate in high-level domestic and international training and academic exchanges, bringing back cutting-edge knowledge for teaching.For in-service faculty, vocational skill certificates and digital professional certifications should be promoted to standardize and sustain digital skill development. Finally, performance evaluation and incentive mechanisms should be established, incorporating factors such as participation in enterprise projects, guidance of student digital practice outcomes, and introduction of frontier technology cases into performance appraisals, with preferential treatment in promotions, research funding, and compensation to foster healthy competition and continuous improvement.

5.3 Strengthening Industry–Education Integration and Deep Enterprise Involvement

To cultivate high-quality digital talent that meets industry needs, higher vocational colleges must deepen industry–education integration, shifting enterprises from being "participants" to "co-creators" in education.First, long-term, stable cooperation mechanisms with industry should be built to form demand-oriented collaborative education models. Colleges can sign strategic agreements with leading enterprises, industrial parks, and digital platform companies to jointly establish "industry colleges" and "joint laboratories," bringing enterprise technologies, cases, equipment, and data directly into classrooms and training environments.Second, enterprises should be engaged in the entire talent cultivation process, not merely providing internships. This may include participating in training program and curriculum standard development, converting real business processes and digital application cases into teaching resources; assigning engineers and technical experts as part-time lecturers for project-based teaching and technical seminars; and co-developing virtual simulation platforms and online courses based on industrial applications.In practice teaching, an integrated model of "order-based" training, on-the-job internships, and project-based practice should be promoted, ensuring students undertake tasks such as data collection and analysis, system operations, and platform optimization in real projects—enhancing both skill proficiency and job adaptability. A joint evaluation mechanism involving both colleges and enterprises should be established to assess students' technical skills, collaboration abilities, and innovation capacity, embedding industry hiring standards into the quality evaluation system for talent cultivation.Finally, enterprises should be encouraged to link their own digital transformation projects with college research and technical services to achieve mutual benefits in technology commercialization and industrial upgrading. For example, enterprises can commission colleges to develop data platforms or configure smart equipment, while colleges use these projects to enrich teaching cases and research output, creating a sustainable, mutually empowering model of industry–education collaboration.

6. Case Study: Digital Talent Cultivation Practices in a Typical Higher Vocational College

6.1 Case Background

Taking a higher vocational college in Guangdong Province as an example, in recent years the institution has comprehensively advanced reforms in digital talent cultivation, focusing on disciplines such as intelligent manufacturing, modern logistics, and digital finance. The college has established partnerships with multiple industry-leading enterprises to jointly build an Industrial Internet training center, a smart logistics laboratory, and a fintech training platform. In terms of curriculum design, the college implements a "digitalization + specialty" dual-integration model. For instance, in the intelligent manufacturing program, courses on IoT device operation and maintenance as well as data analysis have been introduced; in the logistics management program, instruction on smart warehousing management systems has been added.Regarding faculty development, more than 10% of the college's specialized course instructors are assigned annually to enterprises for temporary positions, where they participate in digital transformation projects. As for industry–education integration, students are required to complete at least six months of digital-position internships at partner enterprises and to participate in actual enterprise projects during their studies.

6.2 Effectiveness Evaluation and Lessons Learned

After three years of continuous reform and practice, the college's digital talent cultivation model has achieved remarkable results. In terms of employment indicators, the alignment between graduates' digital skills and job requirements has significantly improved. According to alumni tracking surveys, the proportion of graduates able to independently complete digital business tasks within three months of employment rose from 62.4% before the reform to 85.7% afterward. Average starting salaries increased by 18.6%, and graduates advanced more quickly in their organizations compared to peers from other institutions.From employer feedback, satisfaction with the college's graduates in areas such as proficiency with digital tools, data analysis capabilities, and project collaboration skills increased from 78% before the reform to 91% afterward, with particularly strong performance noted in roles involving Industrial Internet platform operations and smart logistics system management.In terms of teaching quality, both course evaluations and student learning outcomes have improved significantly. The newly established Industrial Internet training center, smart logistics laboratory, and fintech training platform have enabled students to access enterprise-grade equipment and systems while still in school, greatly enhancing their hands-on skills and problem-solving abilities. The adoption of project-based teaching and the incorporation of real-world cases have increased student engagement and the transferability of knowledge. Moreover, the proportion of faculty undertaking enterprise placements or participating in project development has risen to 35%, effectively narrowing the "time lag" between teaching content and the latest industry technologies.Experience from this case shows that the success of digital talent cultivation reform relies on three core factors:Precise alignment between curricula and industry needs, ensuring teaching content is closely tied to real application scenarios in enterprise digital transformation;Continuous practical updating of faculty, maintaining synchronization with technological frontiers through enterprise placements, industry training, and technical certification;Practice-based learning driven by real projects, enabling students to develop comprehensive abilities through solving actual business problems.This case demonstrates that only with a full chain of support—comprising institutional safeguards, resource investment, and collaborative construction between colleges and enterprises—can digital talent cultivation truly achieve quality improvement and sustainable development.

7. Conclusion

Starting from the macro background of digital economy development, this paper systematically analyzes the current situation and demand gaps in digital talent cultivation in China's higher vocational colleges, and proposes targeted optimization pathways. The study shows that while significant progress has been made in building digital education systems, shortcomings remain in aligning curricula with industry needs, enhancing faculty digital capabilities, and deepening industry–education integration. By improving curriculum systems, building composite faculty teams, strengthening school–enterprise cooperation, and advancing digital teaching platform construction, higher vocational colleges can effectively enhance the quality of digital talent cultivation, thereby providing strong talent support for the sustainable development of China's digital economy.

References

[1] Liu, F., Wang, C., & Kang, J. (2023). Exploration and thinking on the training of new business applied talents under the background of digital economy: Take tourism management as an example. *Journal of Human Resource Development, 5*(3), 41–49. https://doi.org/10.23977/jhrd.2023.050307

[2] Zeng, X., & Li, Y. (2023). Strategies for talent's digital competence development at higher vocational colleges

for digital transformation. *Journal of Education, Health and Sport, 13*(1), 23–30. https://doi.org/10.12775/JEHS.2023.13.01.003

[3] Liu, T., Zhang, Y., & Zhang, H. (2023). The impact of differentiated development of the digital economy on employment quality—An empirical analysis based on provincial data from China. *Sustainability, 15*(19), 14176. https://doi.org/10.3390/su151914176

[4] Ruilin, Z., & Lin, L. (2023). Research on the integration mode of production and teaching of digital marketing talents training in application-oriented universities. *International Journal of New Developments in Education, 5*(17), 11. https://doi.org/10.25236/IJNDE.2023.051724

[5] Li, X., Chen, Z., & Chen, Y. (2024). The impact of digital talent inflow on the co-agglomeration of the digital economy industry and manufacturing. *Systems, 12*(8), 317. https://doi.org/10.3390/systems12080317

[6] Fan, Y., Luo, S., & Li, D. (2024). Overview and developmental analysis of China's technical and vocational education and training. *International Journal of Innovative Research and Scientific Studies, 7*(1), 251–260. https://doi.org/10.53894/ijirss.v7i1.2606

[7] Luo, Y. (2023). Research on the talent training of cross-border e-commerce. *Open Access Library Journal, 10*(1), 1–9. https://doi.org/10.4236/oalib.1109725

[8] Di, C., Tang, D., & Xu, Y. (2023). Impact of digital economy on the high-quality development of china's service trade. *Sustainability, 15*(15), 11865. https://doi.org/10.3390/su151511865

[9] Yang, C., Zhang, X., Shi, X., & Liu, Q. (2023). Sustaining the quality development of German vocational education and training in the age of digitalization: Challenges and strategies. *Sustainability, 15*(4), 3845. https://doi.org/10.3390/su15043845

[10] Yu, Z., Liu, L., & Zhang, X. (2024). Bridging the gap: Enhancing employment opportunities for Normal University graduates in China's knowledge economy. *Journal of the Knowledge Economy*, 1–38. https://doi.org/10.1007/s13132-024-02147-w