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2025 Volume 3, Issue 10
Educational Innovation Research
ISSN: 3029-1844(Print) ISSN: 3029-1852(Online)

Pathways for Enhancing Employment Competitiveness of Higher Vocational Students from the Perspective of Industry-Education Integration

Pingqi Tong*
Hainan Vocational University of Science and Technology, Haikou 571126, Hainan, China

**Author to whom correspondence should be addressed.*

Abstract: In an era of profound economic restructuring and accelerated industrial transformation, higher vocational education—as a pivotal platform for cultivating technical and skilled professionals—plays a critical role in shaping regional industrial transformation and optimizing social talent ecosystems. While vocational education continues to expand in scale with graduates maintaining high employment rates, underlying challenges have emerged: insufficient alignment between academic programs and job market demands, limited career sustainability, and growing recognition gaps in corporate evaluation of graduates 'comprehensive competencies. These issues highlight structural tensions between educational supply and industrial needs. Industry-education integration, serving as a strategic nexus connecting educational systems, talent pipelines, industrial chains, and innovation networks, offers fundamental solutions through systematic restructuring of school-enterprise partnerships and optimized training processes. Grounded in the theoretical foundations and practical logic of industry-education integration, this study analyzes operational bottlenecks and mechanisms while proposing actionable enhancement strategies. The research aims to provide academic support and practical references for vocational institutions to refine educational models and strengthen students' market adaptability, ultimately driving a qualitative leap from "employment readiness" to "job excellence."

Keywords: Industry-Education Integration; Higher Vocational Students; Employment Competitiveness; School-Enterprise Cooperation; Talent Cultivation

Online publication: November 26, 2025

1. Introduction

In an era of profound economic restructuring and accelerated industrial transformation, higher vocational education—as a pivotal platform for cultivating technical and skilled professionals—plays a critical role in shaping regional industrial transformation and optimizing social talent ecosystems. While vocational education continues to expand in scale with graduates maintaining high employment rates, underlying challenges have emerged: insufficient alignment between academic programs and job market demands, limited career sustainability, and growing recognition gaps in corporate evaluation of graduates 'comprehensive competencies. These issues highlight structural tensions between educational supply and industrial needs. Industry-education integration, serving as a strategic nexus connecting educational systems,

talent pipelines, industrial chains, and innovation networks, offers fundamental solutions through systematic restructuring of school-enterprise partnerships and optimized training processes. Grounded in the theoretical foundations and practical logic of industry-education integration, this study analyzes operational bottlenecks and mechanisms while proposing actionable enhancement strategies. The research aims to provide academic support and practical references for vocational institutions to refine educational models and strengthen students' market adaptability, ultimately driving a qualitative leap from "employment readiness" to "job excellence."

2. The Connotation and Practical Challenges of Industry-Education Integration

2.1. Widespread phenomenon of insufficient fusion depth

Current school-enterprise collaborations predominantly focus on superficial interactions such as internship arrangements, lecture sharing, and equipment donations, failing to address the core aspects of talent development. Corporate participation often remains limited to a "resource input" role, with restricted influence in key teaching activities like curriculum standard development, instructional content updates, and practical training project design[1]. This results in difficulties in effectively integrating industry-leading technical specifications, production processes, and management concepts into educational resources. Some collaborative initiatives exhibit tendencies toward "event-driven" or "festival-style" approaches, such as concentrated recruitment presentations or short-term visits during specific periods, lacking systematic design spanning academic programs and sustained engagement. Such superficial collaborations lead to teaching content updates lagging behind industrial technological advancements, creating a disconnect between students' acquired knowledge/skills and actual job requirements. This ultimately undermines the educational value inherent in industry-academia integration.

2.2. Lack of incentive mechanisms and collaborative dynamics

There exist inherent differences between educational institutions and enterprises in organizational attributes, operational logic, and developmental objectives. Academies prioritize standardized talent cultivation and social benefits, while businesses focus on operational efficiency and human capital returns. Such misalignment of goals often leads to diminished willingness for collaboration. Enterprises engaging in deep partnerships frequently encounter practical challenges including high hidden costs, limited short-term returns, and ambiguous intellectual property rights definitions. This poses particular difficulties for resource-constrained small and medium-sized enterprises (SMEs), which lack sustained motivation for continuous investment. Concurrently, academic institutions lack scientific evaluation mechanisms and incentive systems for collaborative outcomes. Faculty contributions to industry-education integration receive limited recognition in professional title evaluations and performance assessments, dampening their enthusiasm[2]. Without establishing long-term cooperation frameworks featuring clear accountability, shared risk-bearing, and mutual benefit distribution, collaborative efforts risk becoming superficial and fail to foster stable, sustainable collaborative education ecosystems.

2.3. Weak faculty and resource support

The faculty team serves as the critical nexus for implementing industry-education integration, yet vocational college teachers currently lack substantial practical experience in industrial settings. Most educators have primarily pursued academic careers, resulting in limited understanding of real corporate workflows, technical challenges, and management frameworks. Their ability to transform industry cases into teaching materials requires significant improvement. Practical training facilities face dual challenges: high costs for acquiring and maintaining advanced equipment coupled with rapid technological updates, leading to equipment becoming obsolete shortly after deployment. The absence of technology environments synchronized with industry practices and authentic project-based learning platforms often results in oversimplified simulations[3]. This prevents students from developing comprehensive professional competencies in real-world industrial settings, ultimately hindering tangible improvements in employment competitiveness.

3. Current Status and Core Challenges of Employment Competitiveness Among Vocational College Students

3.1. Structural Mismatch Between Employment Quality and Market Supply-Demand

While vocational college graduates maintain high employment rates, core indicators such as major alignment, job technical requirements, and career sustainability have not improved in tandem. Some students, due to limited skill sets or mismatched industry demands, are forced into low-value-added positions with limited growth prospects, restricting their career advancement pathways. Corporate feedback reveals that although new graduates possess basic operational skills, they exhibit significant gaps in advanced competencies like complex problem analysis, cross-functional collaboration, and technical transfer application. These gaps require extended adaptation periods before they can effectively handle core roles. This supply-demand mismatch not only undermines students' career efficacy and professional identity but also creates structural gaps between educational resource allocation and industrial talent needs, resulting in dual inefficiencies in both talent supply and demand[4].

3.2. Skill updates lag behind industrial technological evolution

Against the backdrop of profound industrial transformation driven by digital economy and smart manufacturing, industrial technological paradigms and job competency requirements are undergoing accelerated evolution. However, the curriculum update mechanisms in certain vocational education programs lack dynamic responsiveness, with teaching content failing to promptly incorporate industry standards, advanced processes, and emerging tools. This results in significant "time gaps" and "content mismatches" between students 'acquired skills and real-world application scenarios in enterprises. Particularly in emerging technology fields such as artificial intelligence and industrial internet, students' outdated knowledge reserves and limited practical experience place them at a clear disadvantage in job competition. The lag in skill structure not only weakens students' ability to demonstrate technical competencies during interviews but also undermines their confidence in job performance[5], becoming a critical bottleneck hindering the improvement of employment quality.

3.3. Systematic Deficiency in Professional Competency Development

Modern workplaces have shifted their talent requirements from single-skill orientation to comprehensive competency evaluation, with soft skills such as communication proficiency, teamwork capabilities, accountability awareness, and innovative thinking becoming core criteria for corporate talent assessment. However, vocational education systems still fall short in cultivating implicit competencies like professional ethics, craftsmanship culture, and workplace etiquette through curriculum design and evaluation mechanisms, lacking systematic workplace scenario training and competency development pathways. Common challenges during internships include students struggling to adapt to team dynamics due to ambiguous role transitions, misinterpretation of workplace norms, or inadequate stress resilience, which undermines objective corporate evaluations of their overall capabilities[6]. Structural deficiencies in professional competencies result in students demonstrating limited growth potential early in their careers despite possessing foundational technical skills, hindering their transition from "technical operators" to "problem solvers."

4. The Intrinsic Mechanism of Industry-Education Integration in Enhancing Employment Competitiveness

4.1. Precise Coupling of Educational Content with Industry Needs

The integration of industry and education drives the transformation of teaching content from static pre-planning to dynamic generation. Enterprises are deeply embedded throughout the entire process of talent cultivation program revision, curriculum standard development, and textbook creation, converting real-world production projects, technical challenges, and industry standards into teaching modules and learning tasks. Through this precise alignment, teaching content remains synchronized with industrial technological advancements, realizing the educational value of "learning for practical

application." Students gain exposure to cutting-edge industry trends during their studies, mastering technical logic and operational standards that closely match job competency requirements[7]. This effectively shortens the skill transition period from campus to workplace, significantly enhancing immediate employability and market competitiveness.

4.2. Seamless Integration of Practical Teaching and Workplace Environment

The industry-academia integration initiative addresses the disconnect between "in-school training" and "corporate internships" by establishing an immersive practical education system spanning the entire teaching process. Through collaborative production training bases, modern apprenticeship programs, and innovative approaches like "teaching-learning-doing integration" and project-based instruction, students complete skill development and professional experience in highly simulated industrial environments. Within authentic workplace settings, students not only hone technical operational skills but also naturally acquire workplace communication techniques, quality awareness, safety protocols, and teamwork spirit. This "learning by doing, understanding through learning" practice enables synchronized internalization of professional competencies and ethical standards[8], significantly enhancing students' workplace adaptability and career potential—laying a solid foundation for high-quality employment.

4.3. Synchronous Integration of Talent Evaluation and Industry Standards

The integration of industry and education has driven the evaluation system's transition from "knowledge-oriented" to "competency-oriented" approaches. Corporate technical experts actively participate in developing skill assessment criteria, evaluating practical training programs, and reviewing graduation projects, fully embedding job competency requirements into the evaluation framework. The assessment standards now focus on problem-solving capabilities in real-world scenarios, technical application efficiency, and innovative thinking rather than mere knowledge mastery. This mechanism not only objectively reflects students' ability to address practical industrial challenges but also guides teaching priorities toward market-driven core competencies, ensuring student skill profiles align closely with corporate expectations. By synchronizing evaluation systems with industry standards, graduates demonstrate stronger professional credibility and competitive advantages in the job market, effectively bridging the gap between traditional education assessments and actual industry demands.

5. Specific Implementation Pathways for Enhancing Employment Competitiveness

5.1. Innovate school-enterprise cooperation models to deepen integration

Breaking away from traditional "point-to-point" loose collaboration models, we establish a tangible collaborative education platform centered on industry-academia institutes and joint laboratories. By clarifying authority boundaries and operational mechanisms, we implement regular joint deliberation systems and dynamic resource allocation mechanisms between schools and enterprises, transitioning cooperation from ad-hoc initiatives to institutionalized frameworks. The "dual-track education" model is adopted, forming interdisciplinary teaching teams composed of corporate engineers and academic faculty to jointly undertake curriculum development, project guidance, and evaluation assessments. Targeted training formats such as "order-based classes" and "sponsored programs" are expanded, integrating corporate competency standards into talent development plans to achieve precise alignment between workforce supply and industrial demands. Through institutional innovation, we facilitate the evolution of school-enterprise relationships from superficial resource exchange to deep value co-creation, establishing a sustainable collaborative education ecosystem.

5.2. Dynamic optimization of the curriculum system to ensure content foresight

Establish an agile optimization mechanism of "industry demand-teaching response". Form a professional development advisory committee composed of industry experts, corporate technical specialists, and faculty members to conduct regular analyses of industrial technology evolution and talent requirements, dynamically adjusting academic standards and

curriculum content. Strengthen modular course design by introducing flexible teaching units such as micro-specializations and skill workshops to seamlessly integrate emerging technologies and processes. Advance the "curriculum-certificate integration" reform by organically incorporating vocational skill certification standards into the curriculum system, guiding students to develop a compound competency structure combining "core expertise + industry expansion". Through dynamic curriculum iteration, ensure teaching content remains synchronized with industrial technological advancements, effectively addressing knowledge obsolescence issues and enhancing students' adaptability and diversified competitiveness in market changes.

5.3. Enhancing Teachers' Practical Competence to Strengthen the Linkage Between Education and Industry

Implement the Dual-qualified Teacher Capacity Enhancement Program. Refine the corporate practice system for educators by establishing clear practice cycles, task requirements, and evaluation criteria, while supporting faculty members in deep involvement with corporate R&D initiatives, process optimization, and project management. Establish a "revolving door" mechanism for two-way faculty mobility between academic institutions and enterprises, recruiting skilled professionals as industry professors or adjunct instructors to teach core practical courses. Enhance incentive mechanisms by incorporating teachers' industry engagement performance into professional title evaluations, performance-based compensation systems, and recognition programs to boost intrinsic motivation. Through industry immersion of teaching staff, transform instructional content from theoretical frameworks to practical applications, ensuring classroom cases derive from real-world industrial scenarios and teaching methods align with workplace demands, thereby significantly improving content relevance and teaching effectiveness.

5.4. Establishing a closed-loop employment service system to strengthen end-to-end support

Establish a comprehensive support system integrating teaching, practical training, and employment throughout the entire career cycle. Schools and enterprises jointly establish career development centers to collaboratively conduct vocational competency profiling, job competency assessments, and personalized career planning, integrating career guidance into early academic stages. Implement a "pre-employment" mechanism during internships, enabling companies to participate in student competency evaluations and job matching in advance, while creating priority recruitment channels for high-performing students. Enhance graduate tracking mechanisms by regularly collecting corporate feedback on graduates 'capabilities, forming a closed-loop improvement process of "corporate feedback → teaching optimization." Through holistic and precision-oriented employment services, students' competitiveness is continuously validated and strengthened in real market environments, achieving seamless transition from academic learning to workplace readiness and effectively addressing the "last mile" challenge in employment.

The aforementioned implementation pathways are mutually reinforcing and interlinked: Innovations in school-enterprise collaboration models provide institutional safeguards for curriculum system optimization, dynamic adjustments to the curriculum framework ensure alignment between teaching content and industry frontiers, faculty competency enhancement guarantees teaching quality implementation, and closed-loop employment services achieve market validation of educational outcomes. These four elements synergistically form a systematic practical framework for industry-education integration to boost employment competitiveness, offering sustainable support for high-quality employment of vocational college students.

6. Synergistic Optimization of Policy Support and Social Environment

6.1. Government-targeted policies to stimulate endogenous integration momentum

Strengthen top-level design and institutional support by introducing more operational incentive policies for industry-education integration. Establish dedicated guidance funds to provide substantial support such as tax reductions and project

subsidies for enterprises deeply engaged in collaborative initiatives; streamline approval processes for school-enterprise cooperation projects and eliminate institutional barriers. Incorporate the effectiveness of industry-education integration into the quality evaluation system for higher vocational colleges, emphasizing core indicators including enterprise participation levels, student competency enhancement, and employment outcomes. Support the development of regional industry-education integration information service platforms to facilitate precise demand alignment and efficient resource allocation between schools and enterprises, fostering a policy environment that prioritizes integration and promotes collaboration.

6.2. Establishing a Multi-stakeholder Collaborative Network to Pool Social Synergies

Industry associations should fully leverage their bridging role in standard development, information dissemination, and platform establishment. They should regularly publish industry talent demand guidelines and technical development reports to provide authoritative references for academic program adjustments. Social organizations and industrial parks are encouraged to lead initiatives such as school-enterprise matchmaking events, skills competitions, and achievement exhibitions to enhance the social impact of industry-education integration. Media campaigns should focus on in-depth coverage of exemplary cases and educational outcomes in this field to boost societal recognition of vocational education's value. Through collaborative efforts from multiple stakeholders, industry-education integration should evolve from institutional initiatives to a societal consensus-driven approach, creating a more inclusive and supportive environment for improving vocational students' employment competitiveness.

7. Conclusion

The integration of industry and education serves as a strategic cornerstone for reshaping vocational education ecosystems and enhancing students' employability competitiveness. Its value lies not only in bridging the gap between academic training and industrial needs, but more importantly in establishing a future-oriented, dynamically evolving talent cultivation paradigm. By deepening school-enterprise collaboration mechanisms, optimizing curriculum systems, strengthening faculty-industry connections, improving employment service frameworks, and complementing these efforts with robust policy guidance and societal coordination, vocational colleges can effectively internalize industrial demands as educational momentum. This enables students to develop solid professional competencies, mature career ethics, and sustainable growth potential during their academic journey. As industry-education integration practices continue to evolve and innovate, vocational education will achieve a transformative leap from "meeting demands" to "leading development," while student employment transitions from "job matching" to "value creation." These advancements will provide reliable talent support for high-quality socioeconomic development. Vocational institutions should embrace industrial transformations with an open mindset, advance integration practices through systematic thinking, and demonstrate contemporary relevance by fulfilling dual missions of regional development services and student empowerment.

Disclosure statement

The author declares no conflict of interest.

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