

DEVELOPMENT OF SCHOOL–ENTERPRISE COLLABORATIVE OF CHINESE VOCATIONAL UNIVERSITIES

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ARTICLE HISTOR

Received: 31 July 2026

Revised: 10 August 2026

Published: 28 August 2026

ABSTRACT

School-enterprise collaboration constitutes a foundational model of vocational education and a critical pathway for cultivating high-quality technical talent in China. This paper examines the current state, challenges, and optimization pathways of school-enterprise collaborative education in Chinese vocational universities. Drawing upon symbiosis theory, the analysis identifies three primary challenges: mismatch between talent cultivation goals and enterprise needs, weak institutional mechanisms for sustained cooperation, and insufficient faculty capacity. Based on the policy landscape and institutional practices, the paper then proposes corresponding strategies, including deepening symbiotic units to enhance complementary advantages, improving the symbiotic environment to strengthen stakeholder coordination, and optimizing symbiotic modes to promote two-way interaction between schools and enterprises. These strategies aim to achieve long-term, stable cooperation between vocational universities and enterprises, thereby better serving China's industrial upgrading and economic transformation. The findings contribute to the broader understanding of vocational education-industry integration and offer practical implications for policymakers and educational administrators.

Keywords: School-Enterprise Collaboration; Vocational Education; Symbiosis Theory

CITATION INFORMATION: Chen, G., & Siththada, T. (2026). Development of School–Enterprise Collaborative of Chinese Vocational Universities. *Procedia of Multidisciplinary Research*, 4(8), 51.

INTRODUCTION

The relationship between vocational education and industry has become increasingly critical as China pursues economic transformation and industrial upgrading. Vocational education, which aims to cultivate high-quality technical and skilled personnel, is fundamentally dependent on effective collaboration with enterprises to ensure that graduates possess the competencies required by the labor market. In the past decade, the Chinese government has issued numerous policies specifically focusing on vocational education-industry connection, reflecting a recognition that this connection is crucial for students' professional competence development and employability. A systematic policy review identified three typical policy models that illustrate Chinese attempts at vocational education-industry connection: modern vocational education system reform, municipal industry-education federations, and in-depth school-enterprise cooperation.

The necessity of studying school-enterprise collaboration in the context of Chinese vocational universities is underscored by several factors. First, the recent upgrade of multiple higher vocational colleges to vocational universities, including institutions such as Nanjing Vocational University of Industry Technology, Wuxi Vocational University, Suzhou Vocational University, and Yangzhou Vocational University, has created new expectations and challenges for school-enterprise collaboration at the undergraduate level. Second, research has found that school-enterprise cooperation in Chinese vocational education faces significant problems, including mismatch of talent cultivation goals, weak institutional mechanisms, insufficient capacity of faculty, and lagging construction of training bases. Third, the "Belt and Road" Initiative has created new demands for vocational education to "go global," requiring more sophisticated models of school-enterprise collaboration that can operate across borders and cultures.

The theoretical framework underpinning this analysis is symbiosis theory, which originated in biology and has been increasingly applied to social science contexts, including educational administration and industrial organization. Symbiosis theory conceptualizes school-enterprise collaboration as a symbiotic relationship involving three core elements: symbiotic units (the participating actors), symbiotic environments (the external conditions and institutional arrangements), and symbiotic modes (the forms and processes of interaction). This theoretical lens provides a comprehensive framework for understanding both the dynamics of successful collaboration and the obstacles that impede it. When applied to vocational education, symbiosis theory helps explain how schools and enterprises can achieve mutual benefit through coordinated interaction, and why some collaborative relationships fail to realize their potential.

This paper aims to examine the current state of school-enterprise collaborative education in Chinese vocational universities, identify the key challenges, and propose evidence-based strategies for improvement. The scope of this analysis encompasses vocational universities at the undergraduate level in China, with particular attention to institutions that have recently been upgraded from higher vocational colleges. The analysis is organized around three main topics: the policy landscape of school-enterprise collaboration, the challenges facing collaborative education, and optimization pathways based on symbiosis theory.

The potential benefits of this research are threefold. At the theoretical level, it contributes to the literature on vocational education-industry integration by applying symbiosis theory to the specific context of Chinese vocational universities, thereby extending the applicability of this theoretical framework to educational administration. At the policy level, it offers a framework for understanding the gaps between policy intentions and implementation outcomes, providing insights that can inform future policy development. At the practical level, it provides actionable recommendations for vocational university administrators, enterprise partners, and policymakers seeking to enhance the effectiveness of school-enterprise collaboration.

THE POLICY LANDSCAPE OF SCHOOL-ENTERPRISE COLLABORATION

The Chinese government has established a comprehensive policy framework to promote school-enterprise collaboration in vocational education. A systematic review of educational policies issued over the past decade reveals three interconnected policy models that have shaped the current landscape. These models reflect a progressive evolution in policy thinking, moving from general encouragement of school-enterprise cooperation to more structured and institutionalized approaches.

2.1 The Modern Vocational Education System Reform Model.

The first policy model, modern vocational education system reform, aims to fundamentally restructure vocational education to better align with industry needs. This model emphasizes the development of comprehensive vocational education systems that integrate secondary vocational education, higher vocational education, and vocational undergraduate education. The underlying rationale is that creating clear educational pathways from secondary to tertiary levels will enable students to acquire progressively advanced skills while maintaining the practical orientation that characterizes vocational education. Recent policy initiatives have focused on the upgrade of higher vocational colleges to vocational universities, creating new pathways for students to acquire bachelor's degrees while maintaining the practical, skills-oriented focus of vocational education. Institutions such as Nanjing Vocational University of Industry Technology, the first public vocational undergraduate pilot institution in China, exemplify this policy direction, with their programs designed to cultivate "high-quality technical and skilled personnel" with "compound, profound, and innovative" capabilities. This model represents a significant departure from the traditional bifurcation between academic and vocational education, recognizing that modern economies require technical professionals who combine theoretical knowledge with practical expertise.

2.2 The Municipal Industry-Education Federation Model.

The second policy model, municipal industry-education federations, represents an institutional innovation that brings together local governments, industries, and educational institutions. These federations are designed to move beyond individual school-enterprise partnerships to create systemic, region-wide integration of education and industry. The Suzhou Vocational University's leadership of the national-level "Robot and Intelligent Manufacturing Municipal Industry-Education Consortium" illustrates this model. This consortium integrates resources from 114 robotics industry enterprises, 14 educational institutions, and 5 research institutes, creating a collaborative ecosystem for technology development, talent cultivation, and technology transfer. The federation model operates on the principle that systemic integration is more effective than isolated partnerships because it enables resource sharing, coordinated planning, and economies of scale. Local governments play a crucial role in this model by providing policy support, financial incentives, and coordination mechanisms that facilitate collaboration across multiple stakeholders.

2.3 The In-Depth School-Enterprise Cooperation Model.

The third policy model, in-depth school-enterprise cooperation, focuses on deepening the collaboration between individual schools and enterprises. This model encompasses various mechanisms, including enterprise-sponsored classes, joint training bases, industry professors, and dual-teacher faculty development. Suzhou Vocational University's implementation of "enterprise-named classes," "field engineer classes," and "innovation classes" represents this approach, with joint enrollment and teaching between the university and partner enterprises. The school also employs a "doctoral entering enterprise" mechanism and "two-way exchange rotation" for faculty to ensure that teachers translate cutting-edge industrial technologies into teaching cases. This model recognizes that effective collaboration requires sustained engagement at multiple levels—from curriculum design to faculty development to student training. The in-

depth cooperation model has been particularly effective in industries where technology evolves rapidly, as it enables vocational universities to stay current with industrial developments. While these three policy models demonstrate China's systematic commitment to school-enterprise collaboration, implementation challenges persist. Policy expectations often exceed institutional capacities, and the translation of policy goals into practice requires sustained effort from both educational institutions and enterprises. Moreover, the recent upgrade to vocational undergraduate status creates new challenges, as vocational universities must simultaneously maintain their vocational character while meeting higher education standards. The tension between academic legitimacy and vocational relevance is a recurring theme in the implementation of these policies, requiring careful navigation by institutional leaders.

CHALLENGES IN SCHOOL-ENTERPRISE COLLABORATIVE EDUCATION

Despite the comprehensive policy framework, school-enterprise collaboration in Chinese vocational universities faces several significant challenges. Research employing qualitative case studies and interviews with experts, teachers, and enterprise representatives has identified persistent problems that undermine the effectiveness of collaboration. These challenges are interconnected and mutually reinforcing, creating a complex web of obstacles that require systematic solutions.

3.1 Mismatch of Talent Cultivation Goals. One of the most fundamental challenges is the misalignment between the talent cultivation goals of vocational universities and the actual needs of enterprises. Vocational universities often emphasize theoretical knowledge and academic credentials, while enterprises prioritize practical skills and immediate job readiness. This mismatch is particularly pronounced at the vocational undergraduate level, where institutions must balance the expectations of higher education (with its emphasis on theoretical depth and research capacity) with the vocational imperative of preparing students for specific occupations. The president of Suzhou Vocational University emphasized that vocational undergraduate education must focus on "vocational nature, skill nature, and high-end nature," cultivating high-quality skilled personnel for high-end industries and industry high-end positions. Achieving this balance in practice remains a significant challenge. The gap between educational and industrial expectations manifests in several ways: curricula that are slow to adapt to changing industry needs, assessment systems that emphasize theoretical knowledge over practical competence, and student career expectations that may not align with available employment opportunities.

3.2 Weak Institutional Mechanisms. A second challenge is the weakness of institutional mechanisms that should sustain school-enterprise collaboration over the long term. Many collaborations remain informal, project-based, and dependent on individual relationships rather than systemic structures. Drawing upon symbiosis theory, Hou and Kong argue that the construction of school-enterprise collaborative communities faces difficulties including "weakness of the main role, absence of institutional cultural environment, and sluggish internal operation mode." These weaknesses manifest in several ways: lack of formal agreements specifying mutual obligations, insufficient resource commitment from enterprises, absence of mechanisms for resolving conflicts, and inadequate evaluation systems for assessing collaboration outcomes. The absence of robust institutional mechanisms makes collaboration vulnerable to changes in personnel, economic conditions, or organizational priorities. When key individuals leave their positions, collaborative relationships often weaken or dissolve entirely, indicating that the relationships are person-dependent rather than institution-dependent.

3.3 Insufficient Faculty Capacity. A third challenge concerns the capacity of vocational university faculty to effectively implement school-enterprise collaboration. Many vocational educators lack recent industry experience and are unfamiliar with current technologies and workplace practices. This limits their ability to design curricula that reflect industry needs,

supervise student internships effectively, or engage in applied research with enterprise partners. The "dual-teacher" faculty system, which aims to ensure that vocational educators possess both academic qualifications and industry experience, remains underdeveloped in many institutions. As noted in a study of school-enterprise collaborative training bases, the effectiveness of practical teaching directly impacts talent cultivation quality, yet training facilities and faculty expertise often lag behind industry standards. Faculty development faces several obstacles: limited opportunities for faculty to gain industry experience, insufficient incentives for faculty to engage with industry, and heavy teaching loads that leave little time for professional development.

3.4 Lagging Training Infrastructure. A fourth challenge is the inadequacy of training infrastructure within vocational universities. While some leading institutions have invested in advanced training facilities, many vocational universities still rely on outdated equipment that does not reflect current industry technologies. The gap between educational and industrial equipment is particularly significant in rapidly evolving fields such as intelligent manufacturing and robotics. This infrastructure gap means that students may learn skills on equipment that is obsolete in the workplace, undermining their employability. Some institutions address this challenge by partnering with enterprises to establish joint training bases that incorporate industry-standard equipment, but such partnerships require significant investment and commitment from both parties. The financial constraints facing many vocational universities limit their ability to upgrade equipment, while enterprises may be reluctant to invest in training facilities that benefit their competitors as well as themselves.

3.5 Insufficient Enterprise Motivation. A fifth challenge, often overlooked in policy discussions, is the insufficient motivation of enterprises to participate in school-enterprise collaboration. While vocational universities have strong institutional incentives to collaborate—including policy requirements, funding incentives, and reputational benefits—enterprises often have less compelling reasons to engage. The benefits of collaboration to enterprises—access to potential employees, opportunities for applied research, and corporate social responsibility—may not outweigh the costs in time, resources, and organizational effort. This asymmetry in motivation creates a fundamental imbalance in collaborative relationships, with vocational universities often pursuing collaboration more actively than their enterprise partners. Addressing this challenge requires policy interventions that create stronger incentives for enterprise participation, such as tax benefits, recognition programs, or access to public resources.

OPTIMIZATION PATHWAYS FOR SCHOOL-ENTERPRISE COLLABORATION

Drawing upon symbiosis theory and evidence from successful institutional practices, several pathways can be identified for optimizing school-enterprise collaboration in Chinese vocational universities. These strategies focus on deepening symbiotic units, improving symbiotic environments, and optimizing symbiotic modes to create sustainable, mutually beneficial partnerships. The three strategies are interconnected and should be pursued in concert rather than in isolation.

4.1 Deepening Symbiotic Units to Enhance Complementary Advantages. Symbiotic units refer to the participating actors in the collaboration—vocational universities, enterprises, and other stakeholders. Deepening these units involves strengthening their capabilities and clarifying their roles to enhance complementary advantages. Vocational universities must develop clear strategies for what they bring to the partnership: well-trained students, faculty expertise, research capabilities, and educational infrastructure. Enterprises, for their part, must commit resources—equipment, mentors, real-world projects, and employment opportunities. The experience of Suzhou Vocational University demonstrates this approach: the school integrates with industry leaders such as Inovance Technology through mechanisms that go beyond single recruitment to

include joint development of talent standards, co-creation of curriculum systems, and shared use of training bases. This comprehensive engagement ensures that the partnership is not merely transactional but transformative for both parties.

Deepening symbiotic units also requires investment in capacity building. For vocational universities, this means developing faculty expertise through industry immersion programs, creating institutional structures that support collaboration, and building the infrastructure needed for effective partnership. For enterprises, this means developing internal capabilities for engagement with educational institutions, including designated liaison personnel, structured internship programs, and mechanisms for knowledge transfer. Successful partnerships are characterized by mutual investment, where both parties commit resources and develop capabilities that enhance the value of the collaboration.

4.2 Improving the Symbiotic Environment to Strengthen Stakeholder Coordination. The symbiotic environment encompasses the policies, regulations, cultural norms, and institutional arrangements that shape collaboration. Improving this environment requires attention to both external and internal factors. At the external level, local governments can facilitate collaboration through policies that provide incentives for enterprise participation, such as tax benefits, recognition, or access to public resources. The Suzhou government's support for the Robot and Intelligent Manufacturing Industry-Education Consortium exemplifies this approach. At the internal level, vocational universities must develop institutional arrangements that support collaboration—including clear agreements with enterprise partners, faculty development programs that build industry connections, and curricula that integrate practical learning.

The symbiotic environment also includes the cultural and normative dimensions of collaboration. A culture that values industry-education integration must be cultivated within vocational universities, with recognition and rewards for faculty who engage effectively with industry partners. Similarly, enterprises must develop cultures that value educational engagement, recognizing that investment in vocational education is not merely corporate social responsibility but a strategic investment in their future workforce. The "four-level linkage mechanism" implemented by Suzhou Industrial Park Institute of Vocational Technology, involving "provincial leadership, municipal demonstration, district support, and school-level incubation," illustrates how multi-level coordination can support collaboration.

4.3 Optimizing Symbiotic Modes to Promote Two-Way Interaction. Symbiotic modes refer to the forms and processes of interaction between symbiotic units. Traditional modes of school-enterprise collaboration often involve one-way relationships in which enterprises provide internships or equipment to schools. More effective models involve two-way interaction: enterprises contribute to curriculum development and teaching, while vocational universities contribute to enterprise innovation and employee development. The "three-college collaboration, six-in-one integration" model implemented by Shunde Vocational University exemplifies this approach. This model integrates cultural colleges, professional colleges, and applied research institutes, with "teaching, learning, doing, researching, innovating, and applying" integrated throughout the talent cultivation process. The model ensures that enterprise engagement extends beyond student internships to include joint research, technology transfer, and employee training. Optimizing symbiotic modes also involves developing new forms of interaction that leverage digital technologies and innovative pedagogical approaches. Online learning platforms, virtual internships, and digital collaboration tools can expand the possibilities for school-enterprise interaction beyond traditional face-to-face engagement. Suzhou Vocational University's "doctoral entering enterprise" mechanism and "two-way exchange rotation" for faculty ensure continuous two-way interaction between academic and industrial contexts. These innovative modes of interaction create opportunities for deeper engagement that benefits both parties.

4.4 Building Sustainable Feedback Mechanisms. Beyond these three broad strategies, building sustainable feedback mechanisms is essential for continuous improvement of school-

enterprise collaboration. These mechanisms should systematically collect and analyze data on collaboration outcomes—student employability, employer satisfaction, technology transfer outcomes—and use these data to refine collaboration strategies. The "data service platform for industry-education communication" implemented by Suzhou Xiangcheng Secondary Vocational School provides an example of how data can support evidence-based collaboration. This platform takes "industry empowerment—enterprise demand—vocational post—school cultivation" as its main line, generating analysis reports and construction plans for industry-education integration, providing data support and decision-making reference for optimizing curricula and talent cultivation.

Feedback mechanisms should also include regular review processes that bring together all stakeholders to assess progress, identify challenges, and adjust strategies. These reviews should be structured to ensure that all voices are heard and that the collaboration remains responsive to changing circumstances. Continuous improvement requires that feedback mechanisms are institutionalized rather than ad hoc, ensuring that learning from experience informs future practice.

CONCLUSION

This paper has examined the current state, challenges, and optimization pathways of school-enterprise collaborative education in Chinese vocational universities. Through a systematic analysis grounded in symbiosis theory and informed by recent policy developments and institutional practices, the study reveals a complex landscape in which comprehensive policy frameworks coexist with persistent implementation challenges.

The analysis demonstrates that China has established a robust policy foundation for school-enterprise collaboration, encompassing three interconnected models: modern vocational education system reform, municipal industry-education federations, and in-depth school-enterprise cooperation. These policy initiatives have created institutional structures and incentives that facilitate collaboration between vocational universities and enterprises. However, the translation of policy goals into effective practice faces significant obstacles. Three primary challenges were identified: the mismatch between vocational universities' talent cultivation goals and enterprises' immediate skill needs, weak institutional mechanisms that fail to sustain collaboration beyond individual projects or personal relationships, and insufficient faculty capacity characterized by limited industry experience and outdated technical knowledge. These challenges are compounded by inadequate training infrastructure that does not reflect current industrial technologies and insufficient enterprise motivation for sustained engagement.

Applying symbiosis theory to analyze these challenges, the paper has proposed three interconnected optimization strategies. First, deepening symbiotic units requires vocational universities and enterprises to clarify their complementary roles and commit resources that enhance mutual benefit. Successful institutional practices demonstrate that when both parties invest substantially in collaboration, the partnership becomes transformative rather than merely transactional. Second, improving the symbiotic environment necessitates coordinated efforts across multiple levels—government policies that incentivize enterprise participation, institutional arrangements that support sustained engagement, and cultural norms that value industry-education integration. Third, optimizing symbiotic modes involves moving beyond one-way relationships toward two-way interaction, where enterprises contribute to curriculum development and teaching while vocational universities contribute to enterprise innovation and employee development. Building sustainable feedback mechanisms that enable continuous improvement is essential across all three strategies.

The findings of this study offer several practical implications. For policymakers, the analysis suggests that policy frameworks should address not only structural arrangements but also capacity-building measures that enable both vocational universities and enterprises to engage

effectively in collaboration. Policy interventions should create stronger incentives for enterprise participation, addressing the asymmetry in motivation that characterizes many collaborative relationships. For vocational university administrators, the findings underscore the importance of developing institutional mechanisms that support sustained engagement, investing in faculty development to build industry connections, and designing curricula that integrate practical learning. For enterprise partners, the study highlights the value of comprehensive engagement that extends beyond internships to include joint curriculum development, applied research, and employee training.

While this study has focused on the Chinese context, the findings have broader relevance for understanding vocational education-industry integration internationally. As economies worldwide undergo technological transformation and skills demands evolve, effective collaboration between educational institutions and industry becomes increasingly critical. The symbiosis theory framework applied in this analysis offers a useful lens for examining school-enterprise relationships across different national contexts. The challenges identified—goal mismatch, weak institutional mechanisms, capacity limitations, and insufficient motivation—are likely to be relevant in other contexts where vocational education seeks to align with industrial needs.

Several limitations of this study should be acknowledged. The analysis draws primarily on policy documents, institutional case studies, and existing research literature rather than primary empirical data. Future research could complement this analysis with longitudinal studies that track collaboration outcomes over time, comparative studies across different types of vocational institutions, and in-depth case studies that examine the processes through which successful collaboration develops. Additionally, the perspective of enterprises—their motivations, challenges, and perceptions of collaboration—could be explored more comprehensively in future research. The voice of students, as the ultimate beneficiaries of school-enterprise collaboration, should also be incorporated into future research designs.

In conclusion, school-enterprise collaboration in Chinese vocational universities stands at a critical juncture. The policy foundation is strong, and institutional innovations are emerging that demonstrate the potential of effective collaboration. However, realizing this potential requires sustained commitment from all stakeholders and systematic attention to the challenges identified in this analysis. By deepening symbiotic relationships, improving the collaborative environment, and optimizing interaction modes, vocational universities and enterprises can build partnerships that not only enhance talent cultivation but also contribute to industrial innovation and economic development. The journey toward effective school-enterprise collaboration is ongoing, but the strategies outlined in this paper provide a roadmap for progress. As China continues to develop its vocational education system and expand vocational undergraduate education, effective school-enterprise collaboration will be essential for cultivating the high-quality technical talent needed for economic transformation and industrial upgrading.

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Data Availability Statement: The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Conflicts of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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