Available Online: 2 February 2026 DOI: 10.54254/3049-7248/2026.31646

A comparative study of higher education vocational training models in China and the United States

Xiya Mou

Chengdu Chaoxu Gas Co., Ltd., Chengdu, China

sia_mxy@163.com

Abstract. Against the backdrop of global industrial transformation and upgrading, as well as structural changes in the demand for skilled talent, vocational training in higher education has become a core pillar for enhancing national industrial competitiveness. Employing the methods of literature review and comparative analysis, this paper systematically compares the higher education vocational training models of China and the United States across five key dimensions: policy frameworks, training objectives, curriculum systems, industry–education integration, and faculty development. The findings indicate that the United States has developed a decentralized model characterized by market-driven dynamics, decentralized governance, and symbiotic partnerships between educational institutions and enterprises, whereas China has established a centralized model marked by government leadership, systematic planning, and institution-centered implementation. These differences stem from the adaptive logic of distinct institutional contexts, industrial structures, and labor market characteristics. The U.S. model demonstrates strengths in market responsiveness and practical effectiveness, while the Chinese model highlights advantages in scale and equity. On this basis, the paper proposes pathways for optimizing China's vocational training model: building a dual mechanism that combines government guidance with market-driven forces, deepening modular curriculum reform, improving long-term collaborative mechanisms for industry–education integration, and strengthening the development of "dual-qualified" faculty. This study provides localized insights for the high-quality development of vocational education in China and contributes to addressing the persistent mismatch between skilled talent cultivation and industrial demand.

Keywords: higher vocational education, training models, China–U.S. comparison, industry–education integration, localized insights

1. Introduction

1.1. Research background

With the global economy undergoing a transition toward digitalization and intelligent development, labor market demand for technical and skilled talent has become increasingly diversified and high-end. According to the literature, the global shortage of highly skilled workers has reached 85 million, with the most acute gaps occurring in manufacturing and high-end service industries. The quality of vocational training directly affects

national industrial competitiveness. As a core component of vocational education, higher education vocational training bears the critical mission of cultivating high-quality technical and skilled professionals and bridging education with industry.

As a representative case of vocational education development under a market-oriented economic system, the United States has established a community-college-led vocational training model that is widely regarded as a key reference for global vocational education reform due to its flexibility and market adaptability. Against the dual backdrop of industrial upgrading and the transformation of demographic dividends, China has built a large-scale vocational training system characterized by government leadership and primarily driven by educational institutions. As of 2023, China had 1,489 higher vocational (junior college) institutions, with an annual training volume exceeding 30 million participants. Nevertheless, persistent problems remain, including misalignment between curricula and industrial needs and insufficient depth of industry–education integration. The vocational training models of both China and the United States represent institutional choices adapted to their respective national contexts. A systematic comparison of their core differences and operational logics can therefore provide valuable insights for the high-quality development of vocational education in China.

1.2. Research significance

At the theoretical level, this study enriches the theoretical framework of comparative research on higher vocational education by moving beyond single-dimension comparisons and constructing an integrated analytical framework encompassing five dimensions: policy, objectives, curriculum, integration, and faculty. Drawing on skills formation system theory and human capital theory, it reveals the adaptive mechanisms linking vocational training models with institutional environments and industrial structures, thereby offering a new theoretical perspective for international comparisons of vocational education models.

From a practical perspective, in response to real-world challenges in China's vocational training—such as delayed market responsiveness, weak practical instruction, and insufficient school–enterprise collaboration—this study draws on the mature experience of the U.S. model to propose actionable optimization pathways. It aims to help China overcome the persistent separation between training and employment outcomes, enhance the quality of skilled talent cultivation, and provide robust human capital support for manufacturing upgrading and the development of the digital economy.

1.3. Review of domestic and international research

Scholars in the United States have focused extensively on the country's vocational training model. Feng Z. et al. argue that the market-driven model in the United States is an adaptive outcome of its market economy and labor market characteristics, with deep enterprise participation forming a closed loop of "demand–training–employment" [1]. Based on social partnership theory, Wei and Ren find that industry–education integration in the United States is enterprise-led and characterized by mutual benefit, with the government primarily activating incentives through policy levers [2]. Tadesse notes that U.S. community colleges have incorporated green, digital, and entrepreneurial skills into their training frameworks, enabling curricula to dynamically align with industrial trends [3]. Existing studies tend to focus on single-model analyses and lack in-depth comparisons of the adaptive logics underlying the Chinese and U.S. models.

Domestic scholars have conducted multidimensional comparative studies of vocational education in China and the United States. From the perspective of industry–education integration, Shen Cheng highlights the core differences between China's institution-led, government-driven model and the U.S. enterprise-led, market-driven model [4]. Chen Yong compares faculty development standards in the two countries and emphasizes the insufficient practical orientation of China's "dual-qualified" teaching workforce [5]. Using automobile

maintenance programs as a case study, Wu Xili provides a detailed analysis of differences in curriculum systems between the two countries [6]. Wu Yilin et al. focus on the training of graduate students in higher education studies, constructing a China–U.S. comparative framework based on training objectives, curriculum structure, and content [7]. While existing research has covered several core dimensions, it still lacks a deep exploration of the adaptive logic of vocational training models, and the systematic coherence and practical feasibility of proposed optimization pathways remain to be further strengthened.

2. Core concepts and theoretical foundations

2.1. Definition of core concepts

Higher Education Vocational Training: Higher education vocational training refers to educational activities conducted at the tertiary level that focus on the cultivation of specific occupational skills and professional competencies. Its primary objective is to meet the demand for technical and skilled talent arising from industrial development, while simultaneously enhancing individuals' employability and supporting their long-term career development. The defining characteristics of higher education vocational training include strong practicality, occupational orientation, and applicability, with an emphasis on the deep integration of theoretical knowledge and production practice.

Training Model: A training model denotes the organic configuration and operational mechanism of key elements in vocational training—such as goal orientation, curriculum design, instructional organization, school–enterprise collaboration, and faculty development—formed under specific educational philosophies and institutional environments. Training models exhibit pronounced contextual adaptability and are shaped by factors including institutional settings, industrial structures, and labor market characteristics.

2.2. Theoretical foundations

Skills Formation System Theory: This theory posits that vocational education essentially constitutes an institutionalized system of skills formation that is closely linked to industrial relations and the labor market. The choice of a particular model represents a solution to social contradictions within a given historical context. Differences in skills formation systems between China and the United States determine the differentiated characteristics of their vocational training models: the U.S. model tends to be market-led, whereas China's approach is predominantly government-led and characterized by large-scale skills formation.

Human Capital Theory: According to Schultz's human capital theory, education and training are core means of enhancing human capital and exert a direct influence on labor productivity and economic growth. As an important form of human capital investment, vocational training requires a model design that balances individual skill enhancement with alignment to industrial demand. The differences between Chinese and U.S. training models are, in essence, reflections of divergent orientations in human capital investment.

Cooperative Education Theory: The American Cooperative Education Conference defines "cooperative education" as an educational approach that integrates theoretical learning, skills development, and practical work experience. This theory constitutes a core theoretical underpinning of the U.S. vocational training model. By emphasizing collaborative talent cultivation between educational institutions and enterprises, cooperative education theory provides an important analytical lens for examining differences in industry–education integration between China and the United States.

3. A comparative analysis of the core dimensions of higher education vocational training models in China and the United States

3.1. Comparison of policy support frameworks

3.1.1 United States: emphasis on decentralized governance and market incentives

The U.S. vocational training policy system is characterized by a dual emphasis on decentralized governance and market-based incentives. The federal government provides strategic guidance through specialized legislation, while state governments and industry associations take primary responsibility for implementation. *The Carl D. Perkins Career and Technical Education Act*, as the core legislative framework, allocated USD 1.4 billion in funding in 2023, with a focus on supporting cooperative programs between community colleges and enterprises, faculty training, and the upgrading of training facilities. This Act delegates substantial authority over policy formulation and implementation to state governments, granting institutions a high degree of operational autonomy—a defining strength of the U.S. higher vocational education governance system [8].

At the state level, California has introduced the Regional Alignment Plan for Career Education, which links training funds directly to regional industrial demand. Training programs aligned with local semiconductor and new energy industries are eligible for funding subsidies of up to 120 percent. Industry associations play a leading role in the development of skill certification systems, having established 132 occupational skill standards covering core sectors in manufacturing and services. Enterprises, incentivized by policies such as tax credits (up to 15 percent) and pre-tax deductions for donated training equipment, are deeply involved throughout the vocational training process. In 2023, U.S. corporate investment in vocational training accounted for 0.8 percent of GDP, far exceeding the global average of 0.3 percent.

This policy framework of multi-actor coordination enables a high degree of alignment between community college curricula and industrial technical standards, with a reported match rate of 89 percent. Moreover, the average policy adjustment response cycle is only three months. From a legislative perspective, this framework reflects a market-driven logic, leveraging policy instruments to stimulate the endogenous motivation for school–enterprise collaboration [9].

3.1.2 China: coordination between central planning and local implementation

China adopts a policy implementation model characterized by centralized strategic planning combined with localized execution. The central government sets overall objectives and core standards through programmatic policy documents, while local governments are responsible for detailed implementation. The origins of this model can be traced back to the late Qing dynasty, when the establishment of the Ministry of Education as a centralized authority unified curriculum development and institutional supervision nationwide, laying the institutional foundation for centralized educational governance [10]. Since 2015, a series of key policy documents—including the National Vocational Education Reform Implementation Plan and the Action Plan for Innovative Development of Higher Vocational Education—have been issued in rapid succession, forming a relatively comprehensive policy system. Between 2021 and 2025, cumulative special funding for higher vocational education exceeded RMB 200 billion, with priority given to the construction of training bases and the development of "dual-qualified" faculty.

At the local level, Jiangsu Province has promulgated the Measures for Promoting Industry–Education Integration in Higher Vocational Education, establishing a special subsidy mechanism for "industry colleges" and providing start-up funding of RMB 5–8 million per institution for school–enterprise joint initiatives. Guangdong Province has implemented the Quality Enhancement Initiative for Vocational Education, allocating preferential annual funding to programs aligned with industrial demand. Nevertheless, policy

implementation continues to face challenges, including an overemphasis on formal compliance at the expense of substantive outcomes. The feedback loop between market demand and policy adjustment remains relatively long, averaging approximately 18 months.

In addition, policy incentives are predominantly focused on educational institutions, with insufficient motivation for enterprise participation. In 2023, corporate investment in vocational training in China accounted for only 0.2 percent of GDP, making it difficult to generate sustained endogenous momentum for school–enterprise collaboration. From a legislative standpoint, this framework reflects a government-led logic that emphasizes the public welfare attributes of vocational education and its alignment with national strategic objectives.

3.2. Comparison of training objectives

3.2.1 United States: balancing precise job alignment and personalized development

Higher education vocational training in the United States centers on "precise job alignment" as its core training objective and follows the principle of "position-oriented instruction and integration of job roles with curricula". Community colleges and enterprises jointly establish curriculum committees composed of corporate technical managers, industry experts, and faculty members to design training programs, ensuring that graduates can rapidly adapt to real workplace scenarios.

Taking the Automotive Service Technology program at Bronx Community College as an example, its training objectives are directly aligned with entry-level positions such as automotive mechanical repair and electronic system diagnostics. Practical courses account for approximately 65 percent of total instructional hours. At the same time, clear transfer pathways are reserved, allowing outstanding graduates to articulate into four-year applied bachelor's programs, thereby fully meeting students' needs for lifelong learning and career advancement. Graduates of this program achieve a one-year post-graduation career advancement rate of 38 percent, significantly higher than the average for comparable programs.

U.S. vocational training objectives are also characterized by dynamic adjustment. With the rise of the new energy vehicle industry, most community colleges introduced new competency targets—such as battery maintenance and motor control—within six months, ensuring synchronization with technological iteration in industry.

3.2.2 China: dual enhancement of technical skills and comprehensive competencies

In China, training objectives emphasize the dual enhancement of "technical skills and comprehensive competencies", balancing immediate job alignment with long-term development potential in line with the demand for versatile talent arising from industrial upgrading. While cultivating technical and skilled professionals, greater attention is paid to general education, professional ethics, and innovative capacity, with the aim of developing "composite and development-oriented" skilled talent.

Taking the Automotive Maintenance Technology program at Baotou Vocational and Technical College as an example, its training objectives are structured around three modules: practical maintenance skills, technological innovation capability, and professional competence. The practical skills module accounts for 50 percent of the curriculum, while the comprehensive competence module accounts for 30 percent, incorporating courses on teamwork, career planning, and workplace safety. In addition, an elective specialization in new energy vehicle maintenance is offered to respond to the diversified talent demands associated with industrial transformation.

However, adjustments to training objectives must undergo institutional deliberation and approval by education authorities, resulting in relatively long adjustment cycles—averaging about 12 months—which makes it difficult to respond rapidly to emerging industry needs. In recent years, some institutions have

aligned their programs with national strategies by introducing skill development tracks in areas such as intelligent manufacturing and rural revitalization, gradually improving the adaptability of training objectives.

3.3. Comparison of curriculum systems

3.3.1 United States: modularization, dynamism, and alignment with certification standards

Curriculum design in U.S. vocational institutions is distinguished by its modularized and dynamic structure, typically adopting a dual framework of "general education courses plus professional skill modules". General education courses account for approximately 50 percent of the curriculum and focus on the development of transferable competencies such as communication skills, logical reasoning, computer applications, and professional ethics, thereby laying a foundation for career mobility and lifelong learning.

Professional courses are organized around job requirements through the integration of skill modules, with each module corresponding to clearly defined occupational competencies. In the case of automotive service programs, curricula are structured in accordance with ASE/NATEF standards and consist of eight certification modules, including engine repair, automotive electrical and electronic control systems, and braking systems. Faculty continuously update instructional content based on the latest products and technologies introduced by manufacturers. Students are required to obtain ASE certification prior to entering the industry, ensuring standardization and quality assurance in skills training.

Curriculum update cycles are typically only six to twelve months, driven by regular feedback from industry associations and enterprises. For example, electrical automation programs in California community colleges are organized into twelve skill modules. Students may select three to four core modules and two elective modules based on their career plans, thereby customizing their learning pathways. Upon completion of the required credits, students are eligible for graduation. Student satisfaction with course offerings in such programs has reached 82 percent.

3.3.2 China: systematic structure, hierarchical progression, and localized adaptation

In China, curriculum design exhibits a systematic and hierarchical structure, following a progressive sequence of "general education courses–disciplinary foundations–professional core courses–professional electives". This approach emphasizes the integrity and coherence of the knowledge system. General education courses account for approximately 30–35 percent of total coursework and primarily include ideological and political education, mathematics, and English. Ideological and political courses alone account for no less than 15 percent, reflecting a strong emphasis on values education.

Professional courses stress the integration of theory and practice; however, skill modules are often fragmented, with similar competencies distributed across multiple courses. For instance, electrical skills in automotive maintenance are taught through separate courses such as Automotive Electrical Equipment and Automotive Electronic Control Technology, requiring students to complete a full sequence of courses to acquire comprehensive competencies. The proportion of practical training hours varies by specialty: in traditional automotive maintenance programs, practical training exceeds 40 percent, while in new energy vehicle maintenance programs it ranges from 50 to 70 percent. At Sanmenxia Vocational and Technical College, the ratio of theoretical instruction to practical training has reached 3:7.

Curriculum updates in China generally rely on revisions to formal teaching plans and are typically conducted every two to three years, resulting in relatively limited flexibility. In some cases, the update cycle for teaching materials extends to three to five years, leading to misalignment with the latest enterprise technologies and standards. In recent years, pilot initiatives in modular curriculum reform have emerged in some institutions. For example, a higher vocational college in Jiangsu Province reorganized its mechanical

manufacturing program into eight core modules. However, due to constraints in teaching resources and faculty capacity, the degree of integration between these modules and enterprise projects remains below 40 percent.

3.4. Comparison of industry–education integration models

3.4.1 United States: an enterprise-led, symbiotic school–enterprise closed-loop mechanism

The United States has established a long-term mechanism of industry–education integration characterized by enterprise leadership and school–enterprise symbiosis, forming a closed-loop model encompassing "customized talent development–practical training–employment placement–technological feedback". Enterprises are deeply involved throughout the entire vocational training process, not only by providing internship positions and specialized equipment, but also by playing a leading role in key stages such as curriculum development, instructional delivery, and quality evaluation.

Taking the partnership between Boeing and Seattle Community College as an example, the two parties jointly established an "Aviation Maintenance Industry College". Boeing dispatched 12 senior technical experts to participate in curriculum design, integrating the latest maintenance standards for the Boeing 737 and 787 aircraft into teaching content. The company also provided training equipment valued at over USD 10 million, including three decommissioned aircraft and 15 sets of core maintenance tools. Enterprises are responsible for approximately 30 percent of teaching tasks, and during internships students directly engage in real-world maintenance projects, which account for more than 70 percent of internship activities. Upon passing assessments, students can be directly employed by the company. The program achieves a graduate employment rate of 92 percent, with a job retention rate (employment of more than one year) of 85 percent.

The "dual credit system" and tax incentive policies provide strong institutional guarantees for school–enterprise cooperation. Students' enterprise-based practical experiences can be converted into academic credits (up to 20 percent of total program credits), while enterprises participating in vocational training are eligible for corresponding tax reductions, with annual tax relief per enterprise ranging from USD 0.5 to 2 million. Industry associations also lead the establishment of evaluation systems for school–enterprise collaboration, offering graded certification of cooperation outcomes and further enhancing the stability and sustainability of partnerships.

3.4.2 China: an institution-led, government-driven collaborative model

In China, industry–education integration primarily takes the form of institution-led and government-driven collaboration. Most partnerships remain concentrated at the levels of internship provision, equipment donations, and advisory input on curricula, with limited depth of integration. The dominant models are "order-based training" and the co-construction of internship bases. For example, the Automotive Maintenance Technology program at Baotou Vocational and Technical College has established internship bases with three local automobile 4S dealerships, placing approximately 50 students in internships each year. However, internship tasks are largely confined to basic maintenance and customer service, with hands-on training in core maintenance technologies accounting for less than 20 percent of internship content.

Enterprises have relatively limited influence in curriculum development and quality evaluation, and the stability of cooperation relies heavily on government policy support. Most cooperation agreements have a duration of only two to three years, with renewal rates of less than 50 percent upon expiration. Some institutions exhibit a persistent disconnect between training and employment outcomes. This is manifested in curricula that lag behind enterprise technical standards by three to five years, delayed updates of training equipment (with nearly 40 percent of equipment consisting of obsolete models), and insufficient enterprise motivation to participate in teaching. Survey data indicate that only 28 percent of enterprises rate their satisfaction with the skills of higher vocational graduates as "good" or above.

In recent years, the Chinese government has vigorously promoted innovation in industry–education integration by establishing a number of industry colleges and fostering industry–education integrated enterprises. Nevertheless, challenges remain, including divergent objectives between schools and enterprises and inadequately designed incentive mechanisms. A sustainable, endogenous driving mechanismfor industry–education collaboration has yet to be fully established.

3.5. Comparison of faculty development

3.5.1 United States: integration of a dual-qualified structure with dynamic evaluation

The United States imposes stringent requirements on the practical experience of vocational training faculty, resulting in a faculty development system characterized by a "dual-qualified structure combined with dynamic evaluation". Newly appointed practice-oriented instructors are generally required to have at least three years of industry experience and to hold relevant occupational certification. In some high-technology fields, requirements increase to five or more years of professional experience and intermediate or higher-level vocational qualifications.

In California community colleges, practice instructors in mechanical engineering programs are drawn almost exclusively from frontline industry positions, with an average of eight years of industry experience; 60 percent hold senior technician certificates. Full-time faculty are required to undertake enterprise-based professional development for no less than six months every three years, with the content aligned to their teaching specialization. The outcomes of such industry placements account for no less than 30 percent of promotion evaluations; faculty who fail to meet these requirements are ineligible for advancement. Part-time instructors are typically industry technical experts, compensated at no less than 120 percent of the per-hour rate for equivalent on-campus teaching, and their teaching performance is jointly evaluated by enterprises and institutions.

Faculty mobility in U.S. vocational institutions is relatively high. Approximately 15 percent of full-time faculty transition back into industry each year, while a comparable number of industry professionals are recruited into teaching positions, ensuring continuous alignment between instructional content and enterprise technical standards. At present, part-time instructors account for about 45 percent of faculty in U.S. community colleges, forming a balanced structure in which full-time faculty play a leading role, complemented by part-time industry experts.

3.5.2 China: a dual-qualified orientation with incomplete systemic support

China has promoted the development of a "dual-qualified" teaching workforce; however, the practical orientation of this initiative remains insufficient, and a comprehensive system for faculty entry, evaluation, and incentives has yet to be fully established. Although teachers are nominally required to possess industry experience and occupational qualifications, there is a lack of unified entry standards. In some institutions, short-term enterprise visits are recognized as industry experience. As a result, as many as 32 percent of instructors teaching practice-oriented courses lack actual enterprise work experience, and only 45 percent of practice instructors hold relevant occupational certification.

Enterprise engagement for teachers often takes the form of short-term visits or temporary appointments, with an average duration of only one to two months. Opportunities for deep participation in enterprise projects are limited, and targeted evaluation mechanisms are largely absent, causing many such activities to become formalistic. Channels for recruiting part-time instructors are relatively narrow and rely primarily on institutions' own networks. Consequently, the participation of industry experts in teaching lacks stability. Part-time instructors teach fewer than 80 class sessions per year on average and often receive little systematic training in pedagogical methods, resulting in uneven teaching quality.

In recent years, some provinces have piloted incentive policies for "dual-qualified" teachers. For example, Zhejiang Province provides a monthly subsidy of RMB 500 to teachers holding senior vocational qualifications. However, the coverage of such policies remains limited, and a nationally unified guarantee mechanism has yet to be established. Nationwide, the proportion of "dual-qualified" teachers in higher vocational institutions stands at only 56 percent, with a significant share classified as "certificate-based dual qualification", lacking substantial enterprise practice experience. The alignment between faculty capacity and industrial demand therefore still has considerable room for improvement.

4. Strengths, limitations, and adaptive logic of higher education vocational training models in China and the United States

4.1. Strengths and limitations of the U.S. model

Strengths: First, the U.S. model demonstrates strong market adaptability. Decentralized governance and enterprise-led mechanisms enable training content to respond rapidly to industrial iteration, with curriculum update cycles 12–18 months shorter than those in China. On average, community college graduates achieve job–position alignment within 1.5 months after graduation. Second, the model exhibits pronounced practical effectiveness. Modular curriculum design and the deep embedding of practical projects, combined with enterprises' full participation in the teaching process, result in a high degree of alignment between graduates' skills and enterprise demand, reaching 81 percent. This effectively alleviates skill shortages in the labor market. Third, resource allocation is relatively efficient. A diversified funding structure—comprising federal appropriations, state government subsidies, and enterprise investment in an approximate ratio of 3:4:3—ensures sufficient training resources and enables the timely updating of training equipment in line with industrial technological advancement.

Limitations: Despite these advantages, the U.S. model faces several constraints. Regional development disparities persist: the lack of strong central coordination leads to weaker faculty capacity and equipment resources in low-income regions. For example, the average salary of practice instructors in Mississippi community colleges is 30 percent lower than that in California, and graduate employment rates are 25 percentage points lower. In addition, the fragmentation of knowledge systems is a concern. While modular curricula enhance flexibility, they may undermine the coherence of disciplinary knowledge. Approximately 40 percent of graduates report encountering bottlenecks in career advancement due to insufficient theoretical depth at later stages of professional development, which can hinder long-term career progression. Finally, issues of equity remain. Heavy reliance on market mechanisms limits safeguards for disadvantaged groups. The proportion of low-income populations and ethnic minorities receiving high-quality vocational training is only one-third of that of high-income groups, exacerbating employment inequality.

4.2. Strengths and limitations of the Chinese model

Strengths: China's model is characterized by strong capacity for resource integration. Government leadership enables the systematic and large-scale development of vocational training, allowing rapid responses to national strategic priorities. Large numbers of skilled workers can be trained within short timeframes in areas such as intelligent manufacturing and rural revitalization, ensuring talent supply for key industries. Equity is another prominent strength. Unified training standards and public funding mechanisms ensure relatively equal access to vocational education across regions and social groups. In recent years, enrollment rates in higher vocational education in rural areas have increased at an average annual rate of approximately 5 percent, contributing to

educational equity and social mobility. Moreover, China's approach emphasizes comprehensive talent development. By promoting the dual enhancement of technical skills and holistic competencies—through general education and professional ethics training—it lays a solid foundation for students' long-term career development and aligns with the demand for versatile talent generated by industrial upgrading.

Limitations: However, the Chinese model exhibits limited market sensitivity. Institutional autonomy remains constrained, and changes to program offerings and curricula require multi-layered approval processes, making it difficult to respond swiftly to specialized skill demands. The establishment of programs in emerging industries typically lags behind the United States by one to two years. The depth of industry–education integration is also insufficient. Many school–enterprise partnerships remain superficial, with limited enterprise engagement in teaching. As a result, practical training content is often misaligned with actual enterprise needs, and the overall alignment between graduates' skills and enterprise demand stands at only 68 percent. In addition, weaknesses persist in faculty practical capacity. Progress in developing a "dual-qualified" teaching workforce has been slow, and some instructors lack substantive enterprise experience. This disconnect between teaching content and industrial technical standards undermines the quality of skills training.

4.3. Analysis of model adaptation logic

The formation of the U.S. "market-driven" model is highly compatible with its mature market economy, finely specialized industrial structure, and highly mobile labor market [11]. As core stakeholders, enterprises participate deeply in vocational training to secure job-ready talent, reduce recruitment and training costs, and establish a closed-loop system of "demand transmission–talent cultivation–employment placement". While this model enables rapid responses to market change, it struggles to ensure regional equity and systematic knowledge development. This adaptive logic also applies to the field of higher dance education: the diversity and openness of U.S. dance education reflect the country's decentralized governance structure and cultural emphasis on pluralism [12].

By contrast, China's "government-led" model stems from its institutional advantage in mobilizing resources at scale, the need for large-scale skill development during industrial transformation, and a relatively stable labor market structure. Through centralized planning and resource coordination, the government has rapidly established a nationwide vocational training system, ensuring educational equity and alignment with national strategies. While this model excels in large-scale talent cultivation, its market responsiveness and practical effectiveness require further enhancement.

Both models represent rational choices shaped by specific institutional environments and industrial contexts. There is no absolute hierarchy of superiority; rather, optimization should be pursued by grounding reforms in national conditions, selectively drawing on the strengths of the other model, and addressing inherent limitations.

5. Optimizing pathways for China's higher education–based vocational training model

5.1. Establishing a dual policy mechanism of "government guidance + market orientation"

It is necessary to appropriately decentralize institutional autonomy by granting higher education institutions greater decision-making authority in areas such as program design, curriculum adjustment, and faculty recruitment. Specifically, the approval cycle for curriculum updates should be shortened from six months to two months. Institutions should be allowed to independently adjust up to 20% of their program curricula in

accordance with skill standards issued by industry associations, thereby improving the responsiveness of curriculum content to market demand.

A diversified incentive system should be further refined by optimizing the structure of policy incentives and increasing support for enterprise participation in vocational training. The effectiveness of enterprises' involvement in school–enterprise cooperation should be incorporated into Corporate Social Responsibility (CSR) evaluations and government procurement eligibility criteria. Enterprises with substantial participation may be granted tax reductions of up to 15% and fiscal subsidies ranging from RMB 1,000 to 2,000 per participant per year. In addition, a regularized monthly coordination mechanism involving industry associations, educational institutions, and government agencies should be established, through which industry associations periodically release talent demand lists and updated skill standards.

Regional adaptability should be strengthened by encouraging institutions to develop customized training programs aligned with local leading industries [8]. Regional vocational training alliances should be formed to integrate resources from educational institutions, enterprises, and research organizations, enabling the sharing of training facilities and teaching staff. Preferential support should be extended to vocational education in central and western regions to narrow regional disparities and promote educational equity.

5.2. Advancing modularization and dynamic reform of the curriculum system

The curriculum structure should be optimized by increasing the proportion of general education courses to 35%–40%, reducing the share of purely theoretical courses, and expanding offerings in transferable competencies such as communication skills, teamwork, and digital application abilities. Among these, digital application courses should account for no less than 10% of the total curriculum. A reform centered on "integrated skill modules" should be implemented, using skill standards issued by industry associations as the core reference. Dispersed yet similar skills should be consolidated into core modular courses, with each module incorporating authentic enterprise projects.

The effectiveness of practical teaching should be enhanced by increasing the proportion of practical instruction to over 50% of total course hours, with enterprise-based real project practice accounting for no less than 30%. A "project-based learning plus formative assessment" model should be promoted, under which students are required to independently complete two to three real enterprise projects to obtain course credits. A dynamic curriculum update mechanism should be established, allowing for the adjustment of 10%–15% of course content each semester based on enterprise feedback, while shortening textbook update cycles to one to two years.

Vocational skill certification should be more closely integrated with curricula. Drawing on standards such as the U.S. ASE/NATEF system, a nationally unified vocational skill certification framework should be developed to ensure deep alignment between curriculum content and certification requirements. Students should be encouraged to obtain, upon graduation, not only an academic degree but also vocational qualification certificates and enterprise-recognized skill certificates, thereby enhancing their employability and labor market competitiveness.

5.3. Deepening symbiotic school–enterprise integration

The central role of enterprises should be explicitly recognized by establishing a full-process mechanism encompassing "enterprise participation in curriculum development, teaching implementation, and quality assessment". Partner enterprises are required to participate in the development of at least two core courses and assign at least one technical expert to teach full-time (with an annual teaching load of no less than 120 class hours). Enterprise evaluations should account for no less than 30% of students' total grades.

Diverse collaboration models should be promoted by drawing on the U.S. "industry college + dual mentorship" model. This entails co-building industry colleges, jointly formulating training programs, co-developing practical training bases, and forming joint faculty teams. The "dual-credit system" should be expanded, allowing students' enterprise practice experience (cumulative duration of no less than six months) to be converted into academic credits, up to a maximum of 15% of program credits. A risk-sharing mechanism for school–enterprise cooperation should be established, with government, institutions, and enterprises assuming responsibilities for training equipment depreciation, student safety, and other operational risks in a 3:4:3 ratio.

A comprehensive cooperation evaluation system should be constructed under the leadership of industry associations. The system should conduct graded assessments based on curriculum alignment, student employment rates, and job retention rates, with evaluation results directly linked to policy support and financial subsidies, thereby enhancing both stability and effectiveness of collaborations.

5.4. Strengthening the "dual-qualified" faculty workforce

Admission standards should be standardized by formulating unified criteria for dual-qualified ("shuangshi") faculty. Newly appointed practical instructors must possess at least three years of full-time industry experience and a corresponding intermediate or higher professional qualification. Prior to formal employment, they must pass both enterprise-based practical assessments and teaching competency tests.

A continuous professional development mechanism should be established. Full-time faculty are required to engage in enterprise-based training for at least six months every three years, with content precisely aligned to their teaching focus. Enterprises should provide formal practice certification reports, and the outcomes of these training experiences should be directly linked to faculty promotion and remuneration. Part-time faculty sourcing channels should be broadened by establishing a stable talent pool in collaboration with leading regional enterprises, hiring frontline technical experts and senior technicians as instructors.

Incentive policies should be optimized. Faculty holding senior vocational qualifications or participating in enterprise R&D projects should receive a monthly stipend. A "school–enterprise mutual appointment" mechanism should be implemented to encourage faculty to work temporarily in enterprises and enterprise technicians to teach full-time at institutions, thereby breaking barriers to talent mobility. Part-time faculty should be provided with free annual pedagogical training (no less than 20 hours) to enhance teaching effectiveness.

5.5. Advancing digital transformation and empowerment

Hybrid teaching scenarios should be developed by leveraging 5G, VR/AR, and big data technologies to create multi-point, integrated physical–virtual environments. This allows students to engage in learning within simulated contexts, enhancing presence and immersion. A digital resource repository for vocational education should be constructed by integrating digital teaching resources from both schools and enterprises, enabling the sharing of high-quality materials.

Innovative teaching models should be promoted, including Online–Merged–Offline (OMO) approaches. Combined methods such as cloud courses, intelligent technologies, and virtual reality should be implemented in open, immersive practical teaching based on "alternating work–study" and "dual studios". Artificial intelligence technologies can generate "teaching profiles" for instructors and learning profiles for students, supporting ongoing formative assessment and personalized instruction.

Digital literacy should be elevated as a core competency for both teachers and students. Digital application courses should be offered to improve the ability to leverage technology for teaching and learning. A shared

understanding of digital practices should be cultivated, alongside awareness of digital ethics, to train high-quality, digitally proficient technical and skilled personnel.

6. Conclusion and outlook

6.1. Research conclusions

This study systematically compared higher education vocational training models in China and the United States, revealing core differences across five dimensions: policy framework, training objectives, curriculum system, school–enterprise integration, and faculty development. The United States has formed a decentralized model characterized by "market-driven orientation, decentralized governance, and school–enterprise symbiosis", with strengths in rapid market responsiveness and practical effectiveness. China, in contrast, has developed a centralized model characterized by "government-led planning, systematic design, and institution-centered implementation," emphasizing scalability and equity.

The differences between the two models stem from the adaptation logic of institutional background, industrial structure, and labor market characteristics. Neither model is absolutely superior; optimization should focus on context-specific, localized innovation. Optimizing China's vocational training system requires establishing a "government-guided + market-driven" dual mechanism, promoting modular curriculum reform, deepening symbiotic school–enterprise integration, strengthening the dual-qualified ("shuangshi") faculty workforce, and leveraging digital transformation to enhance teaching quality.

6.2. Research limitations

This study focuses on macro-level comparisons between China and the United States, without disaggregating by institution type, and lacks quantitative micro-level analysis [13]. Some data are drawn from literature reviews, with limited field investigation and empirical validation, which should be supplemented in future research.

6.3. Future outlook

Future studies could conduct fine-grained comparative analyses by institutional type and employ surveys, in-depth interviews, and other empirical methods to quantify the effectiveness of different training models, providing more precise evidence for vocational training innovation. Attention should be given to the evolution of vocational training under digital transformation and green development, exploring new models such as online–offline integration, cross-regional collaboration, and green skills cultivation.

Furthermore, international cooperation and exchanges in vocational education could be strengthened to promote mutual recognition of standards, curriculum transplantation, and faculty exchange between China and the United States. By assimilating advanced international practices while developing China-specific vocational education models, China can contribute its expertise and insights to global vocational education development.

References

[1] Feng, Z., Wang, Q., & Liu, N. (2025). *Education in China and the world: National development and global benchmarking*. Shanghai Jiao Tong University Press.

[2] Wei, Y., & Ren, C. (2025). Research on the industry-education integration in higher vocational education from the perspective of social partnership theory. *Edelweiss Applied Science and Technology, 9*(6), 1740–1747.

[3] Tadesse, G. A. (2025). The 3 Gs in the future of technical and vocational education and training (TVET): Go green, go digital, and go entrepreneurial.

[4] Shen, C. (2020). Differences and lessons in the practice of industry-education integration in higher vocational education: A Sino-US comparative perspective. *Mechanical Vocational Education, 2020*(7), 5–8.

[5] Chen, Y. (2018). Comparative analysis of higher vocational education in China and the United States. *Business Economy, 2018*(10), 179–180.

[6] Wu, X. (2024). Comparison of higher vocational automotive maintenance technology curricula between China and the United States: A case study of Baotou Vocational & Technical College and Bronx Community College. *Automobile Maintenance and Repair, 1*, 74–76.

[7] Wu, Y., & Zhao, J. (2021). Optimizing curriculum design in graduate programs of higher education: A comparative study of eight Chinese and US universities. *Teaching Research, 44*(4), 62–70.

[8] Yu, H., Wang, Q., & Zhang, H. (2015). Comparative advantages of higher vocational education in China and the United States. *Education and Vocation, 2015*(2), 23–25.

[9] Shen, C. (2021). Legislative origins and countermeasures in Sino-US higher vocational education: A comparative perspective. *Continuing Education Research, 2021*(10), 63–66.

[10] Zhang, X., Wang, C., & Zhang, K. (2024). Comparative analysis of management mechanisms and social spirit alignment in the early stages of higher education institutions in China and the United States. *Higher Education Logistics Research, 2024*(9), 75–77.

[11] Chen, M., & Zhang, Y. (2022). Comparative characteristics of internationalization in 21st-century higher education in China and the United States: A policy and factor analysis perspective. *Heilongjiang Higher Education Research, 2022*(7), 58–65.

[12] Zhang, Y. (2023). Comparative study of dance education in Chinese and US universities: A case study of Minzu University of China and New York University. *China University Teaching, 2023*(1–2), 114–120.

[13] Ma, W., & Sun, Y. (2025). Comparative study on the cultivation of excellence talent in higher education in China and abroad. *Journal of Beijing City University, 2025*(5), 60–68.