

# Cluster Policies on University-industry Integration in China

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Issued in 2017, the Several Opinions of the General Office of the State Council on Deepening Industry-Education Integration marked a foundational milestone in the development of China's policy framework for industry-education integration. As the first comprehensive national-level policy initiative in this area, the document explicitly called for the coordinated alignment of the education and talent chains with the industrial and innovation chains, while extending industry-education integration from vocational education to the broader higher education sector<sup>Error! Reference source not found.</sup>. The year 2019 represented a critical turning point. The National Implementation Plan for Vocational Education Reform strengthened the role of enterprises as key providers of vocational education<sup>Error! Unknown switch argument.</sup>, while the National Implementation Plan for Pilot Projects on Industry-Education Integration introduced a pilot framework structured around 'cities as nodes, industries as fulcrums, and enterprises as focal points'. This framework promoted the coordinated development of pilot cities, industries, and enterprises committed to industry-education integration<sup>Error! Reference source not found.</sup>. The Implementation Measures for the Development of Industry-Education Integration Enterprises (Trial) further specified the mechanisms for identifying, cultivating, developing, and accrediting enterprises engaged in industry-education integration<sup>Error! Unknown switch argument.</sup>. From approximately 2020 onwards, the policy emphasis began to shift from macro-level institutional design towards the establishment of organizational platforms and the implementation of specific talent-development initiatives. The Guidelines for the Development of Modern Industry Colleges (Provisional) encouraged universities, local governments, industry organizations, and enterprises to jointly establish modern industry colleges<sup>Error! Reference source not found.</sup>. Meanwhile, the Industry-Academia Collaborative Education Programme gradually developed a more standardized operational and governance mechanism<sup>Error! Reference source not found.</sup>. In 2022, the Opinions on Deepening the Reform of the Modern Vocational Education System further institutionalized industry-education integration as a central component of China's modern vocational education system<sup>Error! Reference source not found.</sup>. Issued in the same year, the Special Training Programme for On-site Engineers broadened the practical pathways through which industry-education integration could support the joint cultivation of technically skilled personnel<sup>Error! Reference source not found.</sup>. Subsequently, the Implementation Plan for the Action to Empower and Enhance Vocational Education through Industry-Education Integration (2023-2025) expanded the coverage of pilot cities and enterprises, while accelerating the development of new organizational arrangements, including city-level industry-education consortia and sectoral industry-education integration communities<sup>Error! Reference source not found.</sup>. In 2024, the Notice on Strengthening the Development of City-Level

Industry-Education Consortia further emphasised the importance of using industrial parks as organizational foundations, concentrating resources on leading industries, and improving mechanisms for substantive operation and the alignment of talent supply with industrial demand<sup>[Error! Reference source not found.]</sup>. Accordingly, the policy priority shifted from expanding the number and scale of consortia to improving their operational quality and practical effectiveness. Since 2025, industry-education integration has increasingly been incorporated into policy initiatives relating to the digital economy, artificial intelligence, data resources, and the cultivation of innovative enterprises. Overall, through the continuous evolution and coordinated implementation of the policy framework summarized in Table 1, China has gradually established a multi-level system of industry-education integration characterized by government coordination, enterprise participation, institutional delivery, and sectoral collaboration. This system encompasses regional development strategies, industrial sectors, participating enterprises, organizational platforms, and specialized talent-development programme.

Table 1 China's Policy Framework for Industry-Education Integration

| Date | Policy Documents                                                                                                                              | Link                                                                                                                                                                 |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2017 | <i>Opinions of the General Office of the State Council on Deepening Industry-Education Integration</i>                                        | <a href="http://www.moe.gov.cn/jyb_xxgk/moe_1777/moe_1778/201712/t20171219_321953.html">www.moe.gov.cn/jyb_xxgk/moe_1777/moe_1778/201712/t20171219_321953.html</a>   |
| 2019 | <i>National Implementation Plan for Vocational Education Reform</i>                                                                           | <a href="http://www.moe.gov.cn/jyb_xxgk/moe_1777/moe_1778/201904/t20190404_376701.html">www.moe.gov.cn/jyb_xxgk/moe_1777/moe_1778/201904/t20190404_376701.html</a>   |
| 2019 | <i>National Implementation Plan for Pilot Initiatives on Industry-Education Integration</i>                                                   | <a href="https://www.ndrc.gov.cn/xxgk/zcfb/tz/201910/t20191009_1181933_ext.html">https://www.ndrc.gov.cn/xxgk/zcfb/tz/201910/t20191009_1181933_ext.html</a>          |
| 2019 | <i>Measures for Developing Industry-Education Integration Enterprises (Trial)</i>                                                             | <a href="https://www.ndrc.gov.cn/xxgk/zcfb/tz/201904/t20190403_962417_ext.html">https://www.ndrc.gov.cn/xxgk/zcfb/tz/201904/t20190403_962417_ext.html</a>            |
| 2020 | <i>Guidelines for the Development of Modern Industry Colleges (Trial)</i>                                                                     | <a href="http://www.moe.gov.cn/srcsite/A08/s7056/202008/t20200820_479133.html">www.moe.gov.cn/srcsite/A08/s7056/202008/t20200820_479133.html</a>                     |
| 2020 | <i>Administrative Measures for the Ministry of Education's Industry-Academia Collaborative Education Programme</i>                            | <a href="http://www.moe.gov.cn/srcsite/A08/s7056/202001/t20200120_416153.html">www.moe.gov.cn/srcsite/A08/s7056/202001/t20200120_416153.html</a>                     |
| 2021 | <i>Implementation Plan for the Review and Evaluation of Undergraduate Education and Teaching in Higher Education Institutions (2021-2025)</i> | <a href="https://www.gov.cn/zhengce/zhengceku/2021-02/07/content_5585584.htm">https://www.gov.cn/zhengce/zhengceku/2021-02/07/content_5585584.htm</a>                |
| 2021 | <i>Opinions on Promoting the High-Quality Development of Modern Vocational Education</i>                                                      | <a href="http://www.moe.gov.cn/jyb_xxgk/moe_1777/moe_1778/202110/t20211012_571737.html">www.moe.gov.cn/jyb_xxgk/moe_1777/moe_1778/202110/t20211012_571737.html</a>   |
| 2022 | <i>Opinions on Deepening Reform in the Development of the Modern Vocational Education System</i>                                              | <a href="http://www.moe.gov.cn/jyb_xxgk/moe_1777/moe_1778/202212/t20221222_1035691.html">www.moe.gov.cn/jyb_xxgk/moe_1777/moe_1778/202212/t20221222_1035691.html</a> |
| 2022 | <i>Notice on Launching the Special Training Programme for On-Site Engineers in Vocational Education</i>                                       | <a href="https://www.gov.cn/zhengce/zhengceku/2022-11/05/content_5724757.htm">https://www.gov.cn/zhengce/zhengceku/2022-11/05/content_5724757.htm</a>                |
| 2023 | <i>Action Plan for Enhancing Vocational Education through Industry-Education Integration (2023-2025)</i>                                      | <a href="https://www.gov.cn/zhengce/zhengceku/202306/content_6886061.htm">https://www.gov.cn/zhengce/zhengceku/202306/content_6886061.htm</a>                        |

| Date | Policy Documents                                                                                                    | Link                                                                                                                                                                                                                                                                        |
|------|---------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2023 | <i>Notice on Accelerating Key Reform Tasks in the Development of the Modern Vocational Education System</i>         | <a href="http://www.moe.gov.cn/srcsite/A07/zcs_zhgg/202307/t20230717_1069319.html">www.moe.gov.cn/srcsite/A07/zcs_zhgg/202307/t20230717_1069319.html</a>                                                                                                                    |
| 2023 | <i>Ministry of Education Issues Guidelines for Building Sector-Based Industry-Education Integration Communities</i> | <a href="https://www.chinasme.org.cn/html/mcms/daohang/zhongxingailan/neishejigou/hyfzyfwb/rlzy/zhengceyujiedu/1704059864143769601.html">https://www.chinasme.org.cn/html/mcms/daohang/zhongxingailan/neishejigou/hyfzyfwb/rlzy/zhengceyujiedu/1704059864143769601.html</a> |
| 2024 | <i>Notice on Strengthening the Development of City-Level Industry-Education Consortia</i>                           | <a href="http://www.moe.gov.cn/srcsite/A07/s7055/202411/t20241111_1162340.html">www.moe.gov.cn/srcsite/A07/s7055/202411/t20241111_1162340.html</a>                                                                                                                          |

## I. Talent Development Ecosystem<sup>Error! Reference source not found.</sup>

### 1. Pilot Cities for Industry-Education Integration

According to the National Implementation Plan for Pilot Initiatives on Industry-Education Integration, pilot cities should possess a strong industrial base and a relatively high concentration of human capital. Since 2019, China has launched its first round of pilot initiatives in selected provinces, autonomous regions, municipalities directly under the central government, and cities with independent planning status. A total of 21 national pilot jurisdictions were subsequently designated, including Jinnan District of Tianjin, Tangshan, Shenyang, the Lin-gang Special Area of Shanghai, and Changzhou. The policy also proposed launching a second round of pilot initiatives in due course to extend the relevant reforms nationwide.<sup>Error! Reference source not found.</sup> Empirical research on the first group of pilot cities indicates that the development of industry-education integration is jointly driven by five major factors. A strong economic base provides financial and market support; leading industries and industrial upgrading generate sustained demand; extensive higher and vocational education resources underpin talent development; an abundant and highly skilled population strengthens urban innovation and industrial capacity; and continued policy support from local governments provides an enabling institutional environment.<sup>Error! Reference source not found.</sup> Accordingly, a pilot city for industry-education integration may be understood as an integrated urban platform through which local governments coordinate industrial, educational, human, fiscal, and spatial resources, thereby providing the institutional environment and material conditions required for diverse forms of industry-education collaboration. As a national pilot city, Qingdao has adopted a coordinated package of measures, including public investment, tax and fee incentives for enterprises, the development of vocational education parks, and reforms to university-industry cooperation mechanisms<sup>Error! Reference source not found.</sup>, thereby promoting closer alignment between education and training provision and regional industrial development.

### 2. Industry-Education Integration-Oriented Sectors

As a sector-level pilot arrangement, an industry-education integration-oriented sector refers to a policy approach whereby provincial governments build on city-level reforms and draw upon regionally competitive leading industries or specialized industrial clusters to deepen industry-education integration in priority sectors and fields. This approach strengthens the coordinating, facilitating, and public-service functions of sectoral authorities and industry

organizations, with the aim of developing exemplary sectors capable of leading wider reform. The policy further calls for the establishment of high-level industry associations and promotional organizations dedicated to industry-education integration. These intermediary bodies are expected to forecast sectoral skills needs, connect the supply of education and training with enterprise demand, organize collaborative projects, and coordinate relevant resources.<sup>Error! Reference source not found.</sup>

### **3. Industry-Education Integration Enterprises**

Industry-education integration enterprises are firms that engage extensively in industry-education collaboration and university-industry partnerships, play a substantive role in the provision and reform of vocational and higher education, and demonstrate a strong capacity to improve the quality of technical and skilled talent development while enhancing the attractiveness and competitiveness of vocational education. Enterprise participation primarily takes two forms: involvement in educational provision and engagement in talent development. Specific activities include establishing or jointly operating vocational education institutions, co-developing academic programme and curricula, constructing internship and practical-training facilities, hosting student placements and workplace-based teacher development, and delivering apprenticeship programme, employee training, and joint technological research and development. To ensure that enterprise participation is substantive and sustainable, the accreditation system follows a ‘development before recognition’ principle. Enterprises apply voluntarily for inclusion in local development and incubation registries, formulate and implement development plans, and are subsequently evaluated by the relevant authorities on the basis of their actual investment, participation in talent-development processes, and measurable outcomes. Enterprises that satisfy the required criteria are formally accredited, whereas underperforming or non-compliant firms may be subject to dynamic adjustment or removal from the scheme.<sup>Error! Reference source not found.</sup> Enterprises included in the national accreditation register are eligible for a coordinated package of financial, fiscal, land-use, and credit incentives. These incentives are linked to firms’ substantive contributions, including investment in vocational education, provision of student internships and practical training, facilitation of workplace-based teacher development, participation in in-depth university-industry collaboration, and construction of integrated practical-training facilities. By ensuring that ‘first movers benefit first’, the policy seeks to strengthen enterprises’ intrinsic motivation to participate in talent development and collaborative innovation, thereby addressing mismatches between talent supply and demand and deficiencies in the generation and transfer of innovation outcomes<sup>Error! Reference source not found.</sup>. Empirical evidence further suggests that the industry-education integration enterprise pilot programme significantly promotes university-industry collaborative innovation and increases the number of patent applications jointly filed by enterprises and higher education institutions<sup>Error! Reference source not found.</sup>.

## **II. Organizational Platforms for Talent Development**

### **1. Modern Industry Colleges**

Driven by policies promoting the differentiated development of research-oriented, application-oriented, and vocationally oriented higher education institutions, local undergraduate institutions have actively sought to transform themselves into application-oriented universities. Within this process, modern industry colleges have emerged as an important organizational

platform for advancing industry-education integration in higher education. According to the Guidelines for the Development of Modern Industry Colleges (Trial), a modern industry college is a new institutional entity for talent development that responds to regional industrial needs and is typically established within an application-oriented university characterized by strong sectoral specialization and close links with industry. Jointly established, governed, and resourced by universities, local governments, industry associations, enterprises, and other stakeholders, such colleges are intended to cultivate highly qualified applied, interdisciplinary, and innovative professionals capable of adapting to and leading the development of modern industries<sup>Error! Reference source not found.</sup>. In practice, they have assumed a variety of organizational forms, including local government-driven, university-initiated, industry association-led, and leading enterprise-driven models<sup>Error! Reference source not found.</sup>. From an organizational development perspective, modern industry colleges generally evolve through three stages. During the preparatory stage, they seek regulatory legitimacy by responding to industry-education integration policies and relational legitimacy by establishing university-government-enterprise partnerships. During the start-up stage, they progressively improve governance arrangements, innovate talent-development models, and strengthen collaborative outcomes. At the mature stage, they expand their social legitimacy through the dissemination of experience, the diffusion of outcomes, and institutional innovation, thereby contributing to the further refinement of relevant rules and standards<sup>Error! Reference source not found.</sup>. Although modern industry colleges have become a significant new avenue for institutional development, particularly among local application-oriented universities, their operation continues to face several challenges. These include difficulties in reconciling the interests of multiple stakeholders, insufficient integration within co-development mechanisms, continued dependence on traditional faculty structures, underdeveloped evaluation systems for application-oriented education, and inadequate sustained support for programme development, faculty capacity, internships and graduate employment, and technological innovation<sup>Error! Reference source not found.</sup>.

## 2. City-Level Industry-Education Consortia

A city-level industry-education consortium is a regional collaborative organization grounded in an industrial park, aligned with the region's leading industries, and jointly established by vocational institutions, enterprises, industry organizations, and other stakeholders. Its principal function is to coordinate reforms in key areas—including academic programme, curricula, teaching materials, faculty development, internships, and practical training—through collaborative educational provision, talent development, employment promotion, and institutional development. In doing so, the consortium seeks to align vocational education resources with the needs of regional industries, enable vocational institutions to become more deeply embedded in their localities and industrial sectors, and facilitate their access to industrial resources while contributing to regional economic development. This arrangement is intended to establish a mutually reinforcing mechanism through which vocational education and regional industry develop in a coordinated manner<sup>Error! Reference source not found.</sup>. The Opinions on Deepening Reform in the Development of the Modern Vocational Education System designate city-level industry-education consortia as one of the 'two wings' of reform within China's modern vocational education system<sup>Error! Reference source not found.</sup>. By 2024, China had established 34 national-level city-level industry-education consortia and more than 200 provincial-level consortia<sup>Error! Reference source not found.</sup>. In essence, a city-level industry-education

consortium constitutes a complex network involving multiple stakeholders. Its governance structure is based on a differentiated allocation of roles and responsibilities: governments provide overall coordination and institutional support; enterprises articulate and lead demand; educational institutions supply skilled personnel; industry associations facilitate coordination and inter-organizational linkages; and research institutions provide technological expertise<sup>Error! Reference source not found.</sup>. However, collaboration among multiple stakeholders also creates governance challenges, including blurred boundaries of authority and responsibility and the inadequate fulfillment of stakeholder obligations<sup>Error! Reference source not found.</sup>. Some participants lack sufficient motivation because the costs of participation are not commensurate with their expected returns, resulting in symbolic participation or free-riding behaviour<sup>Error! Reference source not found.</sup>. These problems constrain the transformation of consortia from the spatial concentration of organizations and resources into stable, substantively functioning, and mutually beneficial institutions for industry-education integration.

### **3. Sector-Based Industry-Education Integration Communities**

Unlike city-level industry-education consortia, which are organized within defined urban and regional boundaries, sector-based industry-education integration communities are structured around specific industries and industrial value chains. They are jointly initiated by leading enterprises, high-performing higher education institutions, and vocational schools, with the participation of industry organizations, research institutions, and upstream and downstream firms across the value chain. As a new organizational form of industry-education integration, these communities seek to pool educational and industrial resources across regions, improve the alignment between educational provision and industrial development, facilitate the efficient coordination of services, and support the development of the sector as a whole<sup>Error! Reference source not found.</sup>. In 2023, the Ministry of Education supported the establishment of the National Rail Transit Equipment Industry-Education Integration Community, marking the formal creation of China's first national-level community of this kind. By 2024, two national-level sector-based communities had been established, while more than 1,000 regional industry-education integration communities had been formally registered at the local level. Since the Ministry of Education issued the Guidelines for the Development of Sector-Based Industry-Education Integration Communities, these organizations have expanded rapidly in number, achieved broad regional and sectoral coverage, and attracted the participation of diverse enterprises and educational institutions. Nevertheless, some communities have exhibited homogenized development patterns and made only limited progress towards substantive collaboration and implementation<sup>Error! Reference source not found.</sup>.

### **4. Open Regional Practice Centers for Industry-Education Integration**

In 2023, the Ministry of Education issued the Notice on Accelerating Key Reform Tasks in the Development of the Modern Vocational Education System, which identified the establishment of open regional practice centers for industry-education integration as a major reform priority<sup>Error! Reference source not found.</sup>. Aligned with major national strategies and regional economic development priorities, these centers are designed to respond to the technological frontier of industrial development. They encompass institution-based, enterprise-based, and public practice centers that integrate practical teaching, workforce and community training, authentic production

activities, and technical services. Unlike conventional practical-training bases, these centers function as comprehensive platforms deeply embedded within regional industry-education integration networks. Their role is gradually evolving from that of a traditional teaching unit into an industrial ecosystem hub that combines talent development, technological research and development, standards development and dissemination, and platform-based capacity building<sup>Error! Reference source not found.</sup>. Their implementation nevertheless faces several major constraints, including the limited operational specificity of supporting policies, relatively loose collaboration among participating stakeholders, and the continuing need to develop robust mechanisms for routine governance and management<sup>Error! Reference source not found.</sup>.

### **5. Demonstration Virtual-Simulation Training Bases for Vocational Education**

According to the Guidelines for the Development of Demonstration Virtual-Simulation Training Bases for Vocational Education, these bases are comprehensive platforms for practice-based teaching established by vocational institutions in response to the development needs of regional economies, industries, and enterprises. Drawing on the production environments, equipment, occupational responsibilities, and competency requirements of advanced enterprises, they employ next-generation information technologies, including virtual reality and artificial intelligence. These bases integrate teaching, practical training, professional development, research, skills competitions, and public science education. They also support the joint development of virtual-simulation learning resources by vocational institutions and enterprises, as well as the demonstration and wider application of technological outcomes. Their principal objective is to address the ‘three highs and three difficulties’ associated with conventional practical training: high investment, high material consumption, and high risk, together with activities that are difficult to implement, observe, or reproduce<sup>Error! Reference source not found.</sup>. Under this model, enterprise production settings, operational processes, occupational standards, and typical work tasks are converted into repeatable and interactive digital learning resources. Vocational educators, enterprise technical personnel, and technology developers jointly participate in resource development and instructional delivery. Guided by the principle of using real-world practice to inform virtual training, virtual training to support real-world practice, and integrating the two, the model connects simulated learning with the operation of physical equipment, production-based training, and workplace practice in enterprises.

## **III. Implementation of Talent Development**

### **1. Industry-Academia Collaboration Education Programme**

The Administrative Measures for the Ministry of Education’s Industry-Academia Collaborative Education Programme specify that the programme is intended to integrate industrial resources throughout the entire process of talent development in higher education through a model characterized by government facilitation, enterprise support, university engagement, joint development, and resource sharing. Administered through the Ministry of Education’s Industry-Academia Collaborative Education Programme Platform, the initiative encompasses six main categories of projects: the development of New Engineering, New Medical Science, New Agricultural Science, and New Liberal Arts; reform of teaching content and curriculum systems; reform of innovation and entrepreneurship education; faculty development; the construction of

practical teaching facilities and training bases; and joint funds for innovation and entrepreneurship<sup>Error! Reference source not found.</sup>. In 2024, the Ministry of Education revised the programme's operational and administrative procedures for project solicitation, approval, completion, and evaluation<sup>Error! Reference source not found.</sup>. Under the revised model, enterprises may issue project calls on a rolling basis, universities assume responsibility for project approval and process management, and education authorities select exemplary outcomes at different administrative levels. These changes strengthen universities' institutional responsibility while increasing the flexibility of university-industry collaboration. Available statistics indicate that the programme currently comprises more than 100,000 university-industry collaborative projects involving over 1,100 higher education institutions and more than 2,000 enterprises. Corporate contributions in funding, software, hardware, and related resources have exceeded RMB 24 billion, including more than RMB 4 billion in direct financial investment. The projects have involved over 500,000 instances of faculty participation and benefited more than 10 million students, making the programme China's largest and most geographically extensive portfolio of industry-academia collaboration initiatives<sup>Error! Reference source not found.</sup>.

## **2. The On-site Engineer Training Model**

The Special Training Programme for On-Site Engineers in Vocational Education targets digitalize and intelligent occupational settings in priority fields, including advanced manufacturing, strategic emerging industries, and modern services. Focusing on frontline technical positions facing acute skills shortages, the programme adopts an apprenticeship model adapted to the Chinese context, develops training standards through practice, establishes specialized on-site engineer colleges, and seeks to cultivate engineers who demonstrate professional craftsmanship and proficiency in technical operations, production processes, management, collaboration, and innovation<sup>Error! Reference source not found.</sup>. On-site engineers are multidisciplinary professionals who apply science and technology creatively to solve practical technical problems in frontline production, engineering, management, and service settings. They are expected to possess an integrated set of competencies, including the ability to manage complex tasks, draw upon interdisciplinary knowledge, engage in innovative thinking, apply intelligent technologies, communicate across organizational units, and manage projects<sup>Error! Reference source not found.</sup>. This model takes enterprises' actual occupational requirements as the starting point for programme design. Educational institutions and enterprises jointly recruit students, organize dedicated cohorts, and develop training plans, while authentic production tasks are transformed into curriculum content and practice-based learning projects. Teaching and practical supervision are jointly undertaken by institutional instructors and enterprise technical personnel, and long-term apprenticeship training is delivered through alternating periods of study and workplace practice. Jointly administered assessments of occupational competence are linked to enterprise decisions concerning job placement, occupational grading, and remuneration, thereby aligning training standards and instructional processes with workplace requirements.

## **3. First-Class Undergraduate Courses Integrating Industry and Education**

The Implementation Opinions of the Ministry of Education on the Development of First-Class Undergraduate Courses, issued in 2019, state that first-class courses designed to cultivate innovative and multidisciplinary talent should integrate industrial technologies with disciplinary

theory, combine competencies across academic specializations, and incorporate multidisciplinary project-based practice<sup>Error! Reference source not found.</sup>. Under the guidance of national policy, Jiangsu Province has introduced separate selection schemes for provincial first-class courses integrating industry and education<sup>Error! Reference source not found.</sup> and for flagship undergraduate programme specializing in industry-education integration<sup>Error! Reference source not found.</sup>. These initiatives promote collaborative talent development at both the course and programme levels. These courses are jointly developed by higher education institutions and enterprises, with industrial technologies, corporate cases, practice-based projects, and enterprise mentors incorporated into the curriculum. This collaborative approach enables course content to be updated in parallel with technological change and industrial development.

As illustrated in Figure 1, China has gradually developed a nested and progressively articulated system of industry-education integration comprising three interrelated levels: ecosystem formation, organizational platform development, and programme- and curriculum-level implementation. At the talent-development ecosystem level, pilot cities, sectors, and enterprises serve as the principal units of industry-education integration. Through regional coordination, sectoral aggregation, and substantive enterprise participation, these units provide the institutional environment, demand-side impetus, and resource support required for the coordinated allocation of educational and industrial resources. At the organizational platform level, modern industry colleges, city-level industry-education consortia, sector-based industry-education integration communities, open regional practice centers, and demonstration virtual-simulation training bases for vocational education incorporate governments, educational institutions, industry organizations, enterprises, and research institutions into relatively stable collaborative networks. These platforms facilitate the cross-organizational mobility and sharing of human resources, technologies, equipment, curricula, and practice-based learning resources. At the implementation level, the Industry-Academia Collaborative Education Programme, the on-site engineer training model, and first-class undergraduate courses integrating industry and education translate industrial needs, occupational standards, production tasks, and technical specifications into curriculum content, teaching projects, practical learning activities, and assessment criteria. Accordingly, China's model of industry-education integration operates through a multilevel transmission mechanism extending from the external institutional environment to meso-level organizational coordination and, ultimately, to micro-level processes of teaching and talent development. This mechanism has contributed to the emergence of a systemic talent-development framework characterized by coordinated interaction across regions, sectors, enterprises, educational institutions, and individual programme.

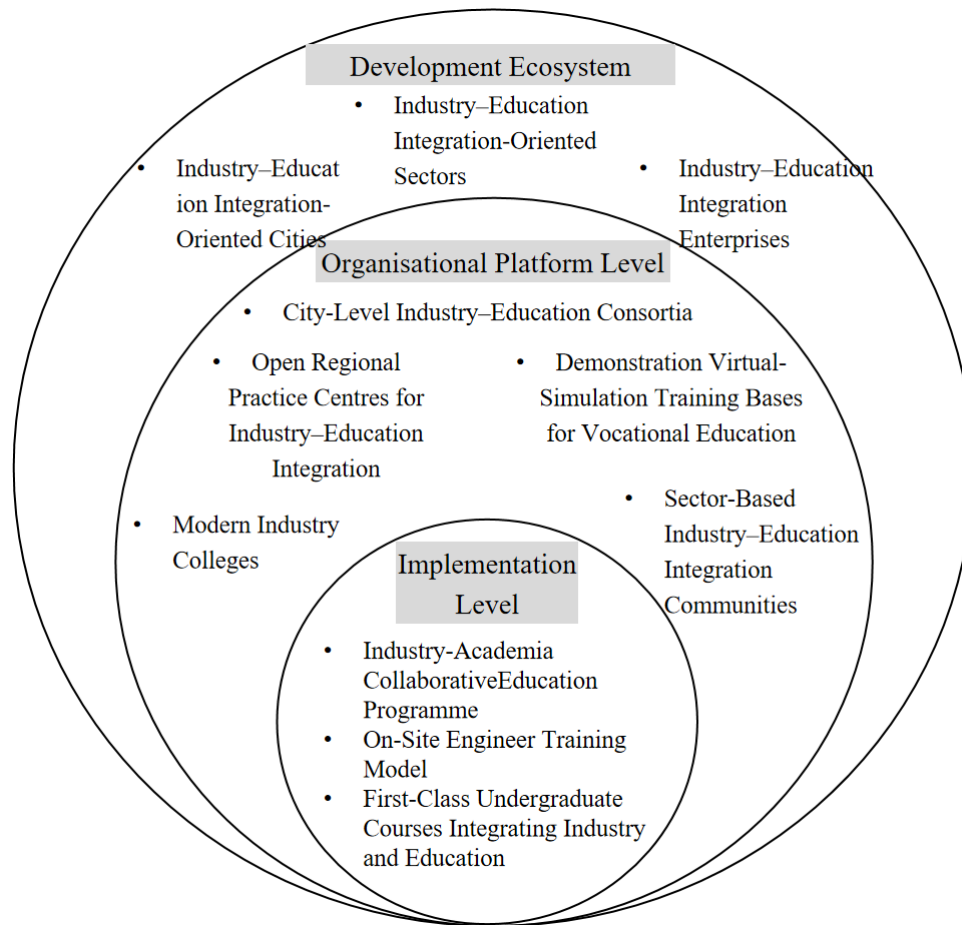


Figure 1 China's Industry-Education Integration Talent Development Model

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