

## PRACTICE FORUM

# School-enterprise collaborative talent development in vocational education in the age of digital intelligence: Innovative pathways in the Shenzhen Polytechnic University-Huawei partnership

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## Abstract

The restructuring of industrial landscapes in the era of digital intelligence has heightened the demand for advanced technical and skilled talents, thereby exacerbating the misalignment between vocational college training programs and the evolving needs of industry. In this context, effective collaborative talent cultivation between schools and enterprises has become a pivotal strategy for bridging the aforementioned gap. This paper presents a case study of the 20-year partnership between Shenzhen Polytechnic University (SZPU) and Huawei Technologies Co., Ltd. We delineated the three evolutionary phases of their collaboration, namely, curriculum restructuring, innovation in talent cultivation, and the co-construction and integration of the industrial ecosystem. We then analyzed the partnership's innovative approaches that were adapted to the digital intelligence era. These approaches encompass the modular restructuring of curricula for SZPU's cluster of information and communications technology programs and its alignment with Huawei technical certifications; the systematic development of next-generation curricula that fully integrates Huawei's foundational technologies; and the upgrading of a talent cultivation model that integrates jobs, competition, and certification into curricula. The SZPU-Huawei collaboration has yielded significant achievements, including a steady enhancement in the depth of school-enterprise cooperation, sustained improvements in the quality of talent cultivation, the formation of excellent dual-qualified faculty, and the establishment of a nationally influential repository of teaching resources. The core lessons derived from this case are anchoring collaboration with leading enterprises, co-constructing industrial ecosystems, and integrating curricula with professional certifications. These offer a replicable and scalable paradigm for advancing collaborative talent cultivation in vocational education and for nurturing innovative, interdisciplinary technical professionals prepared for the age of digital intelligence. This study provides actionable insights into developing vocational education, particularly by outlining strategies for (1) aligning curricula with industry-recognized certifications (*e.g.*, Huawei certifications) and (2) fostering interdisciplinary skills (digital literacy, adaptability) to bridge the gap between academic training and digital industry demands. These findings inform efforts to strengthen vocational education and digital industry integration.

## Keywords

era of digital intelligence, vocational education, school-enterprise cooperation, collaborative talent cultivation, ecosystem co-construction


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## INTRODUCTION

The widespread adoption and deep integration of digital and intelligent technologies across industrial and educational sectors have ushered in a transformative era characterized by interconnected, data-driven systems. In this age, the convergence of artificial intelligence (AI), big data, and related innovations is reshaping industrial landscapes, transforming business models, and raising standards for talent (Department of Vocational and Adult Education, Ministry of Education, 2024). Such developments have driven the demand for skilled professionals to shift from single-function operational roles to interdisciplinary, creative positions that demand digital literacy, cross-domain adaptability, and practical skills (Chinese Society of Vocational and Technical Education, 2025).

The technical competencies mentioned above are cultivated primarily in vocational institutions, which serves as a vital bridge between education and industry, and the quality of vocational education graduates directly shapes the pace and depth of industrial digital transformation. Against the backdrop of rapid industrial changes during the age of digital intelligence, vocational institutions face several persistent challenges: Program structures that are misaligned with industrial development trajectories, curriculum systems that lag behind technological advancements, and training models that fail to meet actual enterprise needs (Huang, 2024; Xi, 2026; Wang & Ying, 2025; Zhuang & Guang, 2025). Addressing these challenges requires vocational education to keep pace with industrial development trends and accurately identify evolving demands for talent as well as requirements for core competencies.

Accordingly, collaborative talent cultivation between schools and enterprises has emerged as a critical strategy for overcoming the aforementioned challenges, apart from being the foundational operating model of vocational institutions (Yu & Ling, 2020). An example is the long-standing partnership between Shenzhen Polytechnic University (SZPU) and Huawei Technologies Co., Ltd., which is grounded in the prevailing directions of industrial development and has undergone multiple stages of exploration and enhancement over two decades. This partnership has produced a collaborative talent cultivation model responsive to the needs shaped by a context increasingly dominated by digital intelligence. Finally, the SZPU-Huawei partnership exemplifies practical innovation in school-enterprise collaboration, with its development and achievements posing important implications for advancing the quality of vocational education in this technological age.

## THE SZPU-HUAWEI PARTNERSHIP: EVOLUTION AND PRACTICE

The SZPU-Huawei partnership originated in the field of communication technology and has evolved alongside three major strategic transformations at Huawei. What began as an initiative of curriculum reform has progressively matured into a comprehensive and systematic model of collaborative talent cultivation. This model's scope has expanded from a single program to a cluster of programs on information and communications technology (ICT), its direction has grown from the integration of technical certification into curricula to the development of foundational technology ecosystems, and its reach has extended from a campus to national and international contexts, following a development path that is synchronized with corporate growth and industrial transformation.

### *Restructuring the curriculum system (2006-2012): Aligning curricula with the technical requirements of enterprises*

During this period, Huawei operated as a traditional vendor of communications technology equipment, primarily serving major telecommunications operators such as China Mobile. The company urgently needed technical engineers proficient in Huawei communication equipment to handle equipment deployment, network construction, testing, and maintenance. The problem was that most Chinese university programs in electronics and information technology were built around discipline-based curricula that emphasized theoretical principles over practical skills. As a result, graduates typically lacked hands-on experience in the aforementioned domains, leaving them inadequately prepared for network operations and maintenance roles.

Meanwhile, the communication technology program of SZPU, established in 1996, was confronted with its own structural challenges. Its curriculum was essentially a condensed version of undergraduate programs for communication engineering, with heavy content overlap with courses on electronic information engineering (Cui et al., 2024; Liu, 2024). The program therefore lacked distinctiveness, producing graduates with limited employability and qualifications that were typically confined to basic mobile phone repair. They were then forced to compete for the same positions in the labor market. To address the mismatch between enterprise demands and institutional training, SZPU initiated curriculum reform centered on Huawei technical certifications, marking the formal beginning of its collaboration with the company.

The series of reforms targeted at SZPU's communication technology program began with arranging annual training

for dozens of faculty members at Huawei and procuring corresponding Huawei products for use as practical training equipment. Huawei's engineer certification courses, originally designed for practicing professionals, were then adapted to the context of vocational education to avoid the mechanical transplantation of enterprise certification materials. Finally, Huawei-certified technologies and equipment operations were embedded into core coursework to harmonize teaching content with actual job requirements.

The reform produced clear improvements, starting with industry-ready graduates, which led to significant gains in employment rates, job relevance in placements, and starting salaries. In addition, graduates required little to no pre-employment training, substantially reducing onboarding costs for Huawei and its partner enterprises.

### ***Innovation in talent cultivation (2013-2019): A model of co-evolution between curricula and certifications***

From 2012 onward, Huawei transitioned from a conventional vendor of communication technology equipment into a provider of comprehensive ICT infrastructure, with the company reorganizing its operations into three business segments: Carrier networks, enterprise and government services, and consumer products (Guo, 2026; Huawei, 2015; Liang, 2013). Its portfolio expanded beyond telecommunications equipment to include mobile devices and computer networking hardware, while its customer base broadened from telecom operators to governments, public institutions, and individual users. This transformation generated strong demand for technical professionals capable of deploying and delivering integrated solutions. In 2014, Huawei launched the Huawei Certified ICT Expert (HCIE) qualification (Wu et al., 2024; Shi, 2025) and gradually built a far-reaching certification framework covering routing and switching, cloud computing, the Internet of Things (IoT), big data, and AI. Collaborating with upstream and downstream partners, Huawei co-constructed an ICT ecosystem anchored in its proprietary technologies (Huawei, 2023; Shao et al., 2024).

In response to Huawei's strategic transformation and evolving talent requirements, SZPU broadened its collaboration portfolio, from the coverage of communication technology to computer network technology, ultimately forming a full-scale partnership spanning its entire ICT program cluster. This partnership, for which Huawei's certification framework served as the connective bridge, directly addressed several long-standing challenges: Discrepancies between the skills held by graduates and those required by employers, insufficient student motivation, and rigid training programs ill-suited to individualized learning paths.

These challenges drove SZPU to develop a model for the co-evolution of curricula and certifications that deeply integrate vocational training with Huawei credentialing benchmarks.

The model's core design introduced advanced industry technologies and corporate culture to underpin a three-tier curriculum structure: Category, phase, and level. It also established a dynamic mechanism for curriculum updating jointly maintained by the school and the enterprise. The framework targeted seven core competencies: Enterprise application analysis, product proficiency, protocol comprehension, logical reasoning, network fault diagnosis, network architecture design, and project management. In practice, Huawei certification requirements were fully embedded throughout the program curricula, encouraging students to earn industry-recognized credentials before graduation. At the same time, updates to certification standards drove iterative improvements in course content, establishing a self-reinforcing cycle in which curricula supported certification preparation while certification requirements propelled curriculum renewal.

The curriculum certification co-evolution model (Ministry of Education, 2019; Xu & Song, 2019) produced exceptional results. By 2018, more than 800 SZPU students had earned Huawei certifications, including 56 at the top-tier HCIE level, the highest total among Chinese higher education institutions. Out of the class of 2017, 5% of graduates held HCIE certification and secured positions with annual salaries exceeding RMB 100,000. Students won first prizes consecutively at the National Vocational College Skills Competition and claimed two successive national championships at the Huawei ICT Competition. SZPU was recognized as one of Huawei's Top 10 Excellent Global Partners and designated as an exemplary Huawei Information and Network Technology Academy, cementing its status as a national benchmark in higher vocational education. The co-evolution model enabled SZPU to overcome the institutional bottlenecks of conventional school-enterprise cooperation, an achievement that earned the university the 2018 National Teaching Achievement Award (Special Grade) while also attracting study visits sponsored by UNESCO, international government bodies, and more than 100 Chinese universities.

### ***Ecosystem co-construction (2020-present): Developing foundational technology and exhaustively integrating industry and education***

The widespread application of AI and other digital technologies has accelerated digital transformation across traditional industries, repositioning Huawei as a premier global provider of digital solutions. Its inclusion in the 2019 US

Entity List further hastened the company's shift to full-stack independent research and development. Six root technologies-programming languages, compilers, operating systems, databases, AI frameworks, and heterogeneous computing architectures-emerged as both the most critical gaps in Huawei's independent technical expertise and the key pillars of its future competitive advantage. Building a viable foundational technology ecosystem requires a large-scale and sustained talent pipeline.

In the digital intelligence age, cultivating excellent talents depends on accurately grasping the trajectory of industrial change and technological development. Accordingly, SZPU has focused primarily on closely following Huawei's strategic direction, deepening understanding of Huawei's technology, and actively participating in the development of root technology ecosystems to nurture professionals adept at digital intelligence. The university has advanced extensive collaboration across three key areas: Curriculum development for teaching root technologies, the competition-oriented cultivation of talent, and the enhancement of partnership platforms.

In the development of curricula for root technology-based education, supported by the Ministry of Education's High-Skilled Talent Cluster Cultivation Program, SZPU collaborated with Huawei and preeminent national electronics and information institutions to develop five foundational technology courses, including Cangjie Programming Technology and Application and three practical training projects that encompass HarmonyOS Software Development: Comprehensive Training. These resources were disseminated to vocational colleges nationwide, addressing a critical national deficiency in foundational technology education. With respect to competition-oriented talent cultivation, SZPU integrated Huawei's ICT competition knowledge and skills with the company's certification standards, refining program curricula and incorporating competition-based content into regular instruction to forge a unified system centered on certification, competition, and course training. As for platform upgrades, the university transformed its on-campus Huawei ICT Academy into the country's first Huawei ICT Academy Support Center (IASC) in 2023. Beyond granting student certification, the IASC delivers faculty development initiatives, provides operational support, and coordinates events for ICT academies across China. These initiatives signify a shift from campus-level training to national capability building.

## **INNOVATIONS IN COLLABORATIVE TALENT CULTIVATION FOR THE DIGITAL AGE**

Having completed the three developmental phases outlined

above, SZPU and Huawei established a partnership oriented toward demands involving the creation of an enterprise technology ecosystem, addressed by Huawei's technical certifications and centered on the joint development of a root technology ecosystem. This partnership has enabled precise alignment between program design and industry development needs, updates to curriculum content that are synchronized with technological progress, and intensive integration between the training process and job requirements. It has therefore produced a comprehensive, multilayered model of school-enterprise collaboration in talent cultivation that is adapted to the digital intelligence era.

### ***Modular restructuring of curricula for the ICT program cluster***

Technological integration amid the digital age calls for interdisciplinary, versatile, and practical talents (Zhou, 2026; Zhu *et al.*, 2024), which SZPU has satisfied by transcending disciplinary barriers to its ICT program cluster and carrying out all-round curriculum reform based on three principles: Modularization, resource sharing, and personalization. The reform has helped the university realize the exchange of teaching resources, the customized training of talents, and full compatibility with Huawei certification standards.

The ICT program cluster comprises four majors: Modern communication technology, computer network technology, mobile internet application technology, and IoT application technology. The revised curricula encompass three categories of courses: Basic professional courses, core professional courses, and elective professional courses (Table 1). All courses are characterized by a modular design that integrates general competence training and specialized learning. Basic courses come with four modules: Network technology, programming, electronic technology, and operating systems. Courses with different difficulty levels are available for selection on the basis of training goals. Core courses lay the foundation for fostering students' professional knowledge and skills. Each major has three exclusive core modules with which to cultivate specialized capabilities and embody disciplinary features. Elective courses are developed based on industry-specific job requirements to align with career paths in technical fields. Two career-oriented modules are offered per major to support individualized learning and professional specialization.

For robust integration with Huawei's certification system, every major in the cluster corresponds to two Huawei certification paths, with requirements fully incorporated into relevant curriculum modules. Specifically, the program on

**Table 1: Curriculum framework for the ICT program cluster**

Item	Communication technology	Computer networks	Mobile internet application technology	IoT application technology
Huawei certification	Data communication Cloud computing	Data communication Network operations	HarmonyOS Cloud computing	IoT
Program extension	Cloud services Data analysis	Cybersecurity	Mobile application development	Smart healthcare
Core courses	Wireless communication module	Web programming System Integration Module	Cloud Services Web Frontend Development Module	Smart Home IoT Communication Module
	Optical Communication Module	Network Interconnection Module	Web Backend Development Module	Embedded System Module
	Data Communication Module	Automated Operation and Maintenance Module	Terminal Hardware Development Module	IoT Application Development Module
Professional foundational courses	Network Technology Module B Network System Module Programming Module A Network Technology Module A Program Introduction	Programming Module B	Electronic Technology Module B Electronic Technology Module A Programming Module B	

ICT, information and communications technology; IoT, Internet of Things.

modern communication technology matches Huawei's certifications for data communication and cloud computing; the computer network technology program is paired with credentials for data communication and network operation; the mobile internet application technology major is intended to align with certifications for HarmonyOS and cloud computing; and the IoT application technology program corresponds with IoT and HarmonyOS certifications.

This modular restructuring not only eliminated course silos across programs and improved the efficiency of resource sharing but also expanded the scope of Huawei credentials, enabling students to choose certification tracks congruent with their individual career goals. The result is a curriculum and certification framework that remains attuned to labor market demands.

***Developing comprehensive Huawei-integrated curricula incorporating root technology***

Using Huawei's certification system as a bridge and the development of Huawei's root technology ecosystem as a strategic anchor, SZPU has systematically integrated the company's technologies throughout its professional curricula.

The university has carefully harmonized target occupations, program courses, and Huawei certification tracks. For the ICT program cluster, it developed 13 Huawei-authorized technical courses that comprise Huawei Certified ICT Associate and select Huawei Certified ICT Professional certifications, covering four certification tracks, namely, data communications, cloud computing, HarmonyOS, and IoT, along with one intermediate certificate course on Huawei vocational skills. Certification content was fully integrated

throughout foundational, core, and elective coursework. Building program curricula around Huawei's established certification system resolved the persistent challenge of unclear curriculum standards in vocational education while enabling rapid, certification-driven content updates, thus keeping instruction in step with emerging industrial technologies. By taking the lead in establishing courses centered on Huawei's root technologies, SZPU has contributed to strengthening national capacity for cultivating talents in independently developed core technologies, thereby supporting China's self-reliant and controllable technology ecosystem while founding a nationally recognized brand in root technology education.

***Upgrading the talent cultivation model oriented toward jobs, courses, and competitions***

SZPU's operations have been guided by the co-evolution model constructed earlier, the occupational demands of the digital age, and the practical requirements for the development of root technology ecosystems. It has thus systematically incorporated occupational requirements and skills competitions into its training framework. The result is an upgraded, model oriented toward jobs, courses, competitions, and certifications that also strengthens the institution's layered, progressive approach to talent development.

The model's design rests on clarifying the logical relationships among occupational requirements, program curricula, skills competitions, and industry certifications, unifying them into a closed-loop system in which job roles define requirements, courses build capabilities, competitions drive excellence, and certifications validate outcomes. To identify priority occupational targets, SZPU established the

Thousand Enterprises Survey mechanism, under which all faculty members visit enterprises annually to investigate industry trends and job competency requirements, informing the design of targeted curricula aligned with Huawei's certification standards. Content from the Huawei ICT Competition and other professional contests is incorporated into teaching and practical training to strengthen students' applied and innovative capabilities. The certifications serve as the culminating benchmarks of training, rendering talent quality both measurable and verifiable.

With regard to skills competitions, the university has established a layered, progressive talent development system that supports individualized student advancement under the ICT program cluster. Building on the differentiated learning pathways emerging from the three-tier curriculum structure, SZPU has implemented a systematic competition preparation program, guiding students through training activities and into advanced coaching courses. This structure provides high-achieving students with a clear pathway for continued development, thereby effectively sustaining learning motivation and fostering innovative potential.

## **OUTCOMES OF THE COLLABORATIVE TALENT CULTIVATION**

In collaborative exploration that has spanned two decades, SZPU and Huawei have progressed from course-level cooperation to comprehensive ecosystem co-construction, leveraging their respective strengths to achieve complementary resource integration and mutual benefit. The partnership has produced wide-ranging and landmark results in reinforcing school-enterprise collaboration, enhancing the quality of talent cultivation, developing faculty capacity, and creating teaching resources. Under this alliance, a large cohort of outstanding, versatile professionals prepared for Huawei's technology ecosystem has been trained, and comprehensive improvements in SZPU's educational quality and institutional competitiveness have been achieved. These accomplishments have made the SZPU-Huawei partnership a national exemplar of vocational school-enterprise collaboration, characterized by exceptional industry leadership and offering broad social value.

### ***Deepening strategic collaboration and building a national empowerment network***

For 20 years decades, the SZPU-Huawei partnership has evolved from limited cooperation involving certification into a comprehensive strategic alliance, with continuously expanding platforms, broadening scope, and deepening integration. It has matured into a multitiered system spanning campus-level training, national capability building, and international exchange, representing an

eminent model of school-enterprise partnerships.

In terms of collaborative platforms, SZPU has established the nation's first university-based Huawei Authorized Training Center and the country's first Huawei Network Technology Academy. In 2020, the Huawei Cloud Kunpeng Center and the 5G+ Digital Talent Industry-Education Integration Base were inaugurated at SZPU; these are state-of-the-art practical training environments. In 2023, the China's first Huawei IASC was established at the university, signaling the partnership's entry into a new phase of joint research and national empowerment.

With respect to the scope of the collaboration, an expansive strategic cooperation agreement signed in 2022 has advanced the coverage of more than 16 program areas, including multiple core digital domains, such as ICT, artificial intelligence, and IoT. This agreement marks a successful transformation from single-program to multi-initiative, cross-domain collaboration.

As for national and global reach, the IASC now offers faculty development initiatives aside from providing operational support and program guidance to Huawei ICT academies across China. These endeavors have driven school-enterprise cooperation and talent cultivation at vocational institutions nationwide. On the international front, SZPU has maintained five years of educational exchange with Singapore's ITE College (Shen, 2023), conducted its first official engagement in the Middle East in 2025, and received delegations representing more than 20 countries, comprising 44 separate visiting groups in 2025 alone, thereby raising the global profile and influence of Chinese vocational education.

### ***Significantly enhanced talent quality and scalable high-performance development pathways***

Through school-enterprise collaborative education, SZPU has achieved substantial improvements in the quality of talent cultivation, producing numerous high-caliber, versatile professionals for Huawei's technology ecosystem and the broader ICT industry. A scalable system for cultivating Huawei-certified engineers has been instituted alongside a structured advancement pathway for exceptional students. The university's student employment outcomes and competition performance consistently rank among the strongest of all vocational institutions in China.

SZPU has also produced more than 4000 Huawei-certified engineers, including over 440 HCIE holders—a figure that represents the top overall among Chinese higher education institutions and approximately 2% of the global HCIE

population. As can be seen, SZPU has evolved into a core talent base for the Huawei ecosystem, having established a scalable pipeline for producing top-tier certified professionals. In terms of employment quality, HCIE graduates are typically offered average annual salaries of RMB 200,000 within two to three years after entering the workforce, far exceeding the average earnings of vocational education graduates.

As regards skills competitions, SZPU students have accumulated outstanding records in both domestic and international arenas, winning one global championship and seven global grand prizes at the Huawei ICT Competitions, including all three global grand prizes in the practical track in 2023. These achievements demonstrate students' solid technical competence and applied innovation capabilities, and they also corroborate the effectiveness of the collaborative talent cultivation model.

### ***Excellent dual-qualified faculty***

Through its partnership with Huawei, SZPU has instituted a systematic and sustainable faculty development mechanism. Drawing on Huawei's certification programs and professional development resources, instructors have strengthened both their technical expertise and pedagogical capabilities, constituting a robust dual-qualified teaching team that provides critical instructional support for outstanding talent cultivation.

A total of 25 faculty members have earned Huawei technical certifications, including six at the HCIE level, placing them among the first cohorts worldwide to hold the AI track HCIE credential. Faculty technical expertise remains consistently in step with the forefront of industry development. SZPU hosted 14 faculty development sessions from 2023 and 2025, benefiting more than 1300 instructors. The training was delivered through a combination of small-group in-person workshops and large-scale online programs, covering key Huawei technologies including HarmonyOS, cloud services, and the Cangjie programming language. This approach has enabled faculty development to be carried out at scale and on a sustained basis.

Moreover, the SZPU faculty has garnered considerable awards in both research and teaching competitions. The project News Application Development Based on HTTP Protocol won the special prize for the teaching track of the Huawei ICT Competition, contributing to a record comprising two special prizes and one first prize. Putting Huawei's premium resources to advantage, SZPU has advanced project-based pedagogy and cultivated a cadre of exceptional professionals, including three recipients of

national leading talent recognition and one provincial model worker.

### ***Nationally influential teaching resource system***

Leveraging its school-enterprise partnership, SZPU has systematically developed superior teaching resources for its ICT program cluster, producing an all-inclusive ecosystem of courses, textbooks, and online platforms. These resources are now used by more than 200 institutions across China and several international partners, providing a solid foundation for the development of first-rate vocational education.

With regard to curriculum development, SZPU has built upon the existing national teaching resource database of its ICT program cluster to develop 13 course modules. In collaboration with Huawei and other enterprises, it has also updated 10 industry certification courses and co-developed 31 professional core courses. During the project period, over 20,000 instructional materials, 51 professional courses, and 4 online English-language courses were created, accumulating over 10 million online learning participants. Both the quantity and quality of these curriculum resources rank among the top in the country.

Another domain in which the SZPU and Huawei collaboration has operated is textbook development, with the partners jointly producing a series of training textbooks. For instance, *Cangjie Programming* was designated a national demonstration material under the Ministry of Education's High-Skilled Talent Cluster Cultivation Program and was selected for inclusion in the second batch of national planning textbooks endorsed in the 14th Five-Year Plan. The *Huawei ICT Competition Official Guide* has become a widely adopted reference textbook, and multiple other materials created during the collaboration have received Outstanding Textbook awards in the Huawei ICT Competition. Such efforts have produced a textbook series that keeps pace with Huawei's technologies and is well calibrated to the needs of vocational talent cultivation.

## **CONCLUSION AND IMPLICATIONS**

The 20-year school-enterprise cooperation between SZPU and Huawei serves as an exemplary model for vocational education adapting to industrial transformation in the era of digital intelligence. Adhering to the principles of ecological co-construction and mutual benefit, both parties have charted a sustainable development path focusing on three core strategies: In-depth cooperation with premier enterprises, joint industrial ecosystem building, and the integration of curricula and vocational certification. This practical experience serves as a valuable reference for

vocational colleges to advance collaborative talent training and cultivate skilled professionals meeting the demands of the digital intelligence era.

The success of the SZPU-Huawei partnership rests fundamentally on its recognition of the intrinsic relationship between vocational education and industrial development in the digital age, on strongly aligning the demands of enterprise development and the objectives underlying institutional talent cultivation, and on the establishment of a sustainable and exhaustively integrated school-enterprise cooperation mechanism. The core lessons from this experience can be distilled into the following principles: First, collaboration with industry-leading enterprises is the core anchor of school-enterprise partnership. Such enterprises are the vanguards of technological advancement, the authority on talent competency standards, and the architects of industrial ecosystems. Their development strategies closely mirror the trends of industrial transformation, while their technical systems set an authoritative benchmark for job requirements. By anchoring partnerships on these corporations, vocational institutions achieve three key objectives: To begin with, they leverage the industry-defining power of these partners, thus accurately grasping industrial trends and talent demands, ultimately ensuring that talent cultivation resonates with industry. Additionally, they rely on these enterprises' technical authority to access cutting-edge resources and practical platforms, keeping instructional content synchronized with industry technology. Finally, they participate in industrial ecosystem construction, integrating talent development into the broader system to significantly boost students' employability and career prospects. Throughout this journey, SZPU has consistently treated Huawei as its core partner. By moving in line with the company's strategic transformation, from technical alignment to ecosystem co-construction, the university guarantees synchronization with both corporate development and industrial change. This serves as the critical prerequisite to their success.

Second, co-establishing industrial ecosystems break the traditional game theory relationship in school-enterprise collaboration. In the digital age, industrial development is characterized by technological convergence and ecosystem interdependence. Active participation in a leading enterprise's industrial ecosystem has become the central mechanism for solidifying school-enterprise collaboration. The co-establishment of ecosystems engenders three major benefits, of which the first is broader employment horizons. Talent cultivation oriented toward an entire ecosystem satisfies the needs of numerous companies operating in it, offering a scope far greater than that acquired from a single enterprise. Another advantage is stronger partnership stick-

iness. Since an ecosystem's development concerns the shared interests of both parties, collaboration transcends the short-term interest "games" of conventional models, clearing the way for long-term, stable relationships. The last benefit is more efficient resource aggregation. Driven by shared value, both parties pool their strengths, such as a school's contribution to its educational expertise with an enterprise's provision of technologies and practical scenarios. This reinforces cooperation through value conversion, thereby enabling mutual success. The SZPU-Huawei collaboration has progressed from narrow technical certification cooperation to the co-establishment of root technology ecosystems. It has positioned SZPU as a meaningful contributor to Huawei's technology ecosystem and exemplifies substantial integration between schools and enterprises.

Third, integrating curricula builds an excellent talent cultivation system. The technical certification systems of industry leaders are standardized manifestations of job competency requirements, typified by scientific rigor, authority, and strong market recognition. Integrating authoritative enterprise certifications throughout the talent cultivation process resolves three principal issues. First, it eliminates ambiguity in the construction of vocational curricula. By using certification standards as a basis, curriculum designers ensure precise alignment between course content and job competencies. Second, it facilitates the training of outstanding faculty. Through certification training, teachers can rapidly upgrade their professional skills, keeping pace with industry technology. Third, it enables the rapid iteration of the curriculum system. Since certification standards update with technological advancements, they drive the dynamic optimization of course content, guaranteeing that talent development always follows the pace of industrial technologies. SZPU's progression from a curriculum-certification co-evolution model to the integrated job-course-competition-certification framework has consistently positioned Huawei's technical certifications as a central benchmark for talent cultivation, considerably unifying academic instruction and industry certification as well as paving the way for an exceptional talent development system.

The era of digital intelligence brings both profound opportunities and urgent challenges to vocational education. As a fundamental operational model of modern vocational education, collaborative talent cultivation between schools and enterprises is essential for advancing superior vocational education and cultivating skilled professionals who can adapt to digital transformation. The cooperation between SZPU and Huawei has formed a replicable and scalable collaborative education model, serving as a practical reference for peer vocational colleges and deliv-

ering solid talent support for the construction of a manufacturing power, a cyberpower, and a digital China.

This study is constrained by the fact that it was grounded exclusively in the cooperative practice between SZPU and Huawei, which may generate risks inherent to overreliance on a single enterprise partner. The continuity of such cooperation depends heavily on an enterprise's resource input and willingness to cooperate. It is therefore susceptible to external fluctuations, including strategic corporate adjustments, changes to business layouts, and updates to school-enterprise cooperation policies. These realities create uncertainties for the long-term stability of cooperation and sustainable talent cultivation.

To address these deficiencies, future research should contribute to optimizing existing school-enterprise collaboration mechanisms by helping build a diversified enterprise cooperation system that reduces overdependence on a single partner. It is also necessary to develop effective risk response and long-term guarantee mechanisms that can adapt to dynamic corporate strategies, industrial changes, and policy updates so as to steadily enhance the stability of school-enterprise cooperation and the sustainability of talent training.

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He JB: Conceptualization, Research framework design and original draft writing. Li ZY, Guo YP: Manuscript writing and revision. Wang K: Data and resource collection and collation. All authors have read and approved the final version.

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Not applicable.

### *Declaration of conflicting interests*

The authors have no conflicts of interest to declare.

### *Generative AI use declaration*

During the preparation of this work, the authors used Qwen 3.7 and Doubao 2.0 to polish the language. After using these tools, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

### *Data availability statement*

No additional data.

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