# A Study on the Practical Path of Collaborative Education between Universities and Enterprises in Vocational Undergraduate Institutions under the Perspective of Industry-Education Integration

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***Abstract:*** This paper analyzes the value connotation of industry-education integrated collaborative talent cultivation in vocational undergraduate education and summarizes the existing problems of current collaborative talent training. To solve these problems, this study proposes targeted strategies including constructing "golden bases" with both practical training and scientific research functions, building a professional "golden teacher" team, developing high-quality "golden majors" and practical-oriented "golden curricula", and establishing a long-term guarantee mechanism for industry-education integration. These measures explore feasible and innovative paths for school-enterprise dual-subject collaborative talent cultivation.

***Keywords:*** Industry-Education Integration; Vocational Education; Collaborative Education; Practical Approach

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## 1.Introduction

In February 2026, the Ministry of Education issued the Opinions on Deepening the Reform of Key Teaching Elements in Vocational Education. It points out that vocational education should shift its talent training focus from single knowledge teaching to comprehensive ability improvement, promote the upgrading of the vocational education system, and realize high-level school running and high-quality development of industry-education integration. The document emphasizes the importance and necessity of industry-education integration for the development of vocational education in China.However, the current vocational education system is poorly connected with industrial development and faces many challenges. For example, industry-education integration lacks depth, educational and industrial resources fail to achieve effective integration, and some cooperative projects remain superficial[1]. These problems restrict the in-depth development of industry-education integration and weaken the supporting role of vocational education in the development of new quality productive forces. Therefore, exploring the sustainable development paths of industry-education integrated collaborative talent training is of great significance for adapting to the high-quality development of vocational education in the new era.

## 2.The Value Connotation of Industry-Education Integration and Collaborative Talent Development in the Context of New Quality Productivity

### 2.1 The Internal Relationship between New Quality Productivity and the Integration of Industry-Education in Vocational Undergraduate Education

The new quality productive forces and the integration of education and industry have a mutually reinforcing relationship. The new quality productive forces are an important driving force for the integration of education and industry. The new quality productive forces are centered on scientific and technological innovation and focus on the integration and efficient utilization of production factors such as knowledge, technology, and information. The rapid development of the new quality productive forces puts forward higher requirements for the future talent needs of

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enterprises, prompting vocational education to keep pace with the times and closely combine with the development trends of the industrial sector to carry out collaborative education and training [2-3]. At the same time, the integration of education and industry is achieved through in-depth cooperation between vocational colleges and advanced manufacturing enterprises, jointly cultivating high-quality skilled talents that meet the development needs of the new quality productive forces.

### 2.2 Deepen the integration of education and industry and promote collaborative education, thereby facilitating the high-quality development of the intelligent manufacturing engineering program

The integration of education and industry, as an important concept and practical model of vocational undergraduate education, builds a bridge between education and industry, promotes the organic connection among the education chain, talent chain, industry chain, and innovation chain, and realizes the coordinated development of the two, thereby providing advantageous resources for the cultivation of professionals in the intelligent manufacturing field [4]. Through the integration of education and industry, teachers can use artificial intelligence to simulate real work scenarios in enterprises, and can also introduce actual projects from enterprises into classroom teaching, and organize students to conduct analyses, design, implementation, and evaluation of physical projects, thereby cultivating students' project management skills and innovation capabilities.

## 3.Current Status and Problems of Collaborative Talent Cultivation Through Industry-Education Integration Between Vocational Undergraduate Colleges and Enterprises

### 3.1 The talent training system is disconnected from industrial posts, and the integration of posts, courses, competitions and vocational certificates remains at a low level

In the process of talent training through industry-education integration, several problems exist. The revision of talent training programs lags behind the iteration of the intelligent manufacturing industry. Teaching arrangements attach too much importance to theoretical learning while ignoring practical engineering training, and interdisciplinary integration is insufficient.Although project-based teaching is adopted in professional courses, real enterprise projects are not fully and deeply integrated into teaching. There is a lack of real cases involving enterprise technological innovation, production line upgrading and process optimization [5]. Courses, skill certificates and skill competitions are separated from one another, making it difficult to realize the integrated design of “setting courses according to job requirements, promoting learning through competitions, and aligning learning with certificate standards”.

### 3.2 The construction of virtual-real fusion training platforms is backward, and the supply of authentic industrial teaching scenarios is insufficient

At present, high-end complete sets of flexible production lines、 collaborative robots、 and digital twin workstations for intelligent manufacturing in on-campus training bases require high investment costs. Restricted by funding, the number of on-campus training equipment sets is insufficient, and there is a generation gap between school equipment and the new-generation automation systems currently applied in enterprises. On-campus training rooms are mainly equipped with independent unit equipment and lack integrated productive training scenarios covering the whole process of design, programming, integration and operation and maintenance, making it difficult to implement the teaching concept of "taking classrooms as workshops". In the process of school-enterprise cooperation, enterprises impose technical confidentiality restrictions on core processes and production line data, which cannot be fully opened for teaching purposes. In addition, constrained by resource conditions, on-campus training equipment, simulation software and laboratories are not open to enterprise employee training. The training bases are only used unidirectionally and fail to realize multi-functional reuse for teaching, production, training and trial manufacturing, resulting in low resource utilization efficiency.

### 3.3 Construction of School-Enterprise Dual-Teacher Team Needs to Be Strengthened

The insufficiency of teaching faculty in current vocational undergraduate colleges is reflected in two major

dimensions:First, full-time on-campus teachers are deficient in engineering practical competence. Most instructors are equipped with profound professional theoretical knowledge but lack frontline enterprise experience in product design and manufacturing. Though teachers are arranged to participate in enterprise practice for one to two months each year, relevant assessment criteria are loose. Such practice activities are mostly limited to site visits and academic exchanges, with few teachers engaging in in-depth corporate technical projects. Meanwhile, teachers carry out a small volume of horizontal research projects, which prevents industrial technical bottlenecks from being transformed into teaching and practical training programs. Consequently, they cannot satisfy the high-standard practical engineering teaching demands of vocational undergraduate education. Second, the part-time teaching system for enterprise engineers and master craftsmen is underdeveloped. Restricted by production shift schedules and corporate performance evaluation mechanisms, senior technical specialists and veteran craftsmen from enterprises cannot sustain regular long-term classroom teaching. In addition, supporting systems for improving their teaching proficiency are incomplete. Most enterprise tutors only deliver occasional guest lectures, rather than systematically participating in curriculum development and hands-on training supervision.

## 4.Innovative Paths for Industry-Education Integration and Collaborative Talent Cultivation of Intelligent Manufacturing Engineering Technology Major Under the Background of New Quality Productive Forces

### 4.1 Building "Golden Practice Bases" with Practical Training and Scientific Research Functions Amid Digital Transformation

Vocational undergraduate colleges should cultivate not only skilled talents with practical abilities, but also innovative high-tech talents. The construction of “golden bases” should integrate the functions of practical training bases and scientific research platforms, featuring specialization, production orientation, cutting-edge attributes and digitalization.First of all, it is necessary to increase capital investment in practical training bases, replace outdated and backward training equipment with new advanced devices equipped with simulation and detection functions, and improve the digital and intelligent level of training bases, so as to simulate real enterprise working scenarios. For the Intelligent Manufacturing Engineering Technology major in vocational undergraduate colleges, digital twin training bases can be built to construct a “virtual enterprise” training environment based on digital twin technology, realizing “five synchronizations”: synchronization between enterprise production processes and teaching processes, synchronization between product R&D technical standards and teaching standards, synchronization between the update of intelligent manufacturing equipment and training equipment, synchronization between production data and teaching data, and synchronization between enterprise management and teaching management.Secondly, the content and form of practical training should reflect practicality and dynamics. Practical teaching contents and project research directions need to be adjusted timely in accordance with industrial development and technological progress.

### 4.2 Constructing a “Golden Teacher” Team for Industry-Education Integrated Collaborative Talent Training

Teachers are the key guides for school-enterprise cooperation and joint talent training. As vocational education develops and reforms in the new age, schools need to build a team of "Golden Teachers". These teachers should have good professional morals, strong technical skills, and include both full-time school teachers and part-time enterprise instructors to support joint training through school-enterprise cooperation.School-enterprise cooperation gives teachers of Intelligent Manufacturing Engineering Technology chances to visit companies, learn new skills and work at enterprise posts. In this way, teachers can refresh their professional knowledge, gain more practical experience, learn company culture and follow the latest industry trends. This better helps students improve their professional knowledge and practical skills.Besides, with school-enterprise cooperation platforms, schools invite intelligent manufacturing industry experts and top skilled workers to train full-time teachers and teach students in class together. This creates "dual-teacher classes". It improves teachers’ teaching and practical skills, and helps students think in more ways.Deep cooperation between schools and companies creates two-way communication channels for school

and enterprise staff. School teachers and enterprise tutors can study what talents the intelligent manufacturing industry needs. They add related industry knowledge into teaching and course standards, and reorganize teaching content. This helps train students whose skills match enterprise job requirements perfectly.

### 4.3 Develop "Golden Majors" Meeting the Demands of the Intelligent Manufacturing Industry

The construction of the Intelligent Manufacturing Engineering Technology major at vocational undergraduate colleges should align with regional industrial layout and development demands. Colleges regularly conduct corporate surveys and consult industry experts to clarify talent standards required by enterprises. They continuously adjust the talent training program based on real industrial needs, which offers basis and guidance for building "Golden Majors".In major construction, colleges should follow the demands of emerging industries and combine advanced technologies. The focus of talent training shifts from "equipment operation and basic maintenance" to system integration, process optimization, digital modeling, intelligent upgrading and technological innovation. This matches the upgrade of new job positions in enterprises and cultivates interdisciplinary compound talents [6].The "Golden Major" of Intelligent Manufacturing Engineering Technology covers advanced fields such as mechatronics, industrial robots, artificial intelligence and digital design. It acts as high-quality ground to cultivate talents for the rapid development of new quality productive forces.

### 4.4 Develop "Golden Curricula" Highly Matched with Posts in Manufacturing Enterprises

The curriculum construction of the vocational undergraduate Intelligent Manufacturing Engineering Technology major should be closely aligned with the cutting-edge technologies required by professional posts and build a “Golden Curriculum” system to support students’ professional knowledge framework. Its core standards include connecting emerging industrial tracks, undertaking new technical processes, integrating scientific and technological innovation iteration, adapting to integrated post competencies, and realizing the integration of courses, competitions, certificates and innovation.The curriculum closely responds to the new post standards, new processes and new technologies brought by industrial transformation. By incorporating the latest job requirements into curriculum construction, colleges update teaching content and restructure the curriculum system, and fully embed new-quality technologies such as digital twin, industrial big data and artificial intelligence.In addition, colleges need to build high-quality digital teaching resources, covering complete curriculum standards, project-based teaching plans, practical training guidelines and question banks. Through school-enterprise project cooperation, teaching resources including industrial project cases and digital twin virtual simulation platforms are developed. Supporting teaching materials are also compiled jointly with enterprises. These project-oriented, innovation-driven and new-technology-based school textbooks better fit the talent training orientation of the vocational undergraduate Intelligent Manufacturing Engineering Technology major.

### 4.5 Constructing a Long-term Guarantee Mechanism for Industry-Education Integrated Collaborative Talent Cultivation in Vocational Undergraduate Colleges

To further advance industry-education integration and collaborative talent training in vocational undergraduate colleges, long-term and stable guarantee mechanisms must be established.Based on its own development needs, each vocational undergraduate major shall carry out top-level planning for industry-education integration. Colleges should actively seek support from the government, industrial associations and cooperative enterprises to realize multi-stakeholder school running. All relevant departments shall work together to form a long-term school-enterprise collaborative training mechanism and boost all-round cooperation between schools and enterprises [7].In addition, a multi-dimensional evaluation and feedback system should be set up. Instead of the traditional qualitative evaluation method, a multi-angle and quantitative indicator system for talent training outcomes needs to be built, so that training results can be visualized and analyzed clearly.

## 5.Conclusion

Taking the Intelligent Manufacturing Engineering Technology major of vocational undergraduate education as an example, this paper analyzes the value connotation of industry-education integrated collaborative talent training under the background of new quality productive forces, as well as practical problems existing in the current industry-education training mechanism. It also puts forward several feasible training mechanisms. Only in this way can we jointly build a new industry-education integration ecosystem for vocational undergraduates with consistent goals, shared resources, mutual benefits and continuous upgrading. This system provides solid support for cultivating a large number of high-level skilled personnel, skilled craftsmen and national master craftsmen who are urgently needed for industrial transformation and upgrading.

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