

Research on Functional Orientation and Quality Assurance Paths of Vocational Undergraduate Colleges from the Perspective of Industry-Education Integration

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Abstract: Driven by industrial transformation and upgrading, vocational undergraduate education has achieved rapid development. As a new form of higher vocational education, vocational undergraduate education undertakes the historic mission of cultivating high-level technical and skilled talents. After being upgraded, some vocational undergraduate colleges suffer from the phenomenon of “changing the signboard without transforming core connotations”, and are confronted with practical dilemmas including ambiguous functional orientation and imperfect quality assurance systems. They tend to drift academically toward general undergraduate education on the one hand, and find it hard to break away from the path dependence on skill training at the junior-college level on the other hand. From the perspective of industry-education integration, vocational undergraduate colleges should effectively connect education and industry, integrate theory with practice, and dynamically adapt to present-day demands and future development, so as to break down barriers among the education chain, talent chain and industrial chain. To match such functional orientation, it is necessary to reconstruct industrial genes in curriculum and teaching, upgrade teachers from “dual-certificate” competence to “dual-capability” competence, transform governance mode from school-enterprise cooperation to school-enterprise co-governance, and build an industry-adaptation-centered quality assurance system. These measures will promote connotative and categorized development of vocational undergraduate education.

Keywords: vocational undergraduate education; industry-education integration; functional orientation; quality assurance

1. Introduction

Since the launch of the vocational undergraduate education pilot program in 2019, China’s vocational undergraduate education has evolved from policy pilot to large-scale school-running. As of October 2026, there are 124 vocational undergraduate institutions nationwide with over 600,000 enrolled students. The Outline for Building a Powerful Country in Education (2024-2035) proposes to steadily expand the number of vocational undergraduate institutions and their enrollment scale, marking that vocational undergraduate education has become an institutional educational arrangement at the national level. Behind the scale expansion, issues regarding its categorical orientation have become increasingly prominent. Vocational undergraduate education is neither a replica of general undergraduate education nor a simple enhancement of higher vocational junior-college education; instead, it represents an innovative advanced form of vocational education oriented toward industrial upgrading.

In real-world school operation, many upgraded colleges fall into dual-faceted developmental anxiety. On the one hand, in pursuit of social recognition at the academic level, they involuntarily imitate the discipline-based school-running mode of general undergraduate institutions. On the other hand, they inherit the training inertia of focusing on practical skills from their junior-college stage. This results in wavering and ambiguous talent-training positioning and difficulty in forming distinctive categorical features. As an institutional design bridging the education system and the industrial system, industry-education integration provides an analytical framework for resolving the orientation confusion of vocational undergraduate education. Located at the coupling node between industrial demands and talent supply, the quality construction of vocational undergraduate education cannot copy the discipline-oriented evaluation model adopted by general undergraduate education. It should establish an industry-adaptation-oriented quality logic, clarify

its own functions centering on industry-education integration, and build a matching quality-assurance mechanism so as to give full play to its function of supplying high-level technical and skilled talents.

2. Triple Functional Orientation of Vocational Undergraduate Education from the Perspective of Industry-Education Integration

2.1 Effective Connection Between Industry and Education

The primary function of vocational undergraduate colleges is to build an institutional connection channel between industrial demands and educational supply. Traditional higher vocational junior-college education focuses on single-point job skills, and its industry-education integration mostly stays at superficial cooperation such as equipment sharing and post internship. General undergraduate education follows the logic of disciplinary knowledge, and industrial practice is often placed as a supplementary link in teaching. Junior-college education lacks comprehensive competence training for tackling complex systematic technical problems, while general undergraduate education tends to be divorced from real-world industrial scenarios, creating a gap in talent cultivation. Vocational undergraduate education can just bridge this gap and realize the leap of talent cultivation from single-point skill operation to systematic technical application competence.

In terms of curriculum structure adjustment, vocational undergraduate education moderately reduces the proportion of practical training class hours while consolidating theoretical foundations, making up for the drawbacks of general undergraduate education (emphasizing theory over practice) and higher vocational junior-college education (emphasizing practice over comprehensive competence). More than 40% of undergraduate graduates from Nanjing Vocational University of Industry Technology enter high-end technical positions in enterprise R&D, with an employer satisfaction rate exceeding 97%, which verifies the practical value of its connecting function from the

employment perspective. Municipal industry-education consortia and sector-specific industry-education integration communities serve as important carriers for implementing this function. Relying on the national-level Industry-Education Consortium for Robotics and Intelligent Manufacturing, Suzhou Vocational University of Technology collaborates with over one hundred leading enterprises, colleges and research institutions. It transforms corporate technical standards and real-world projects into teaching resources, continuously delivers compound technical talents for local industries, eliminates the project-based and fragmented drawbacks of traditional school-enterprise cooperation, and promotes the institutional embedding of industrial demands into the whole process of talent cultivation.

2.2 Organic Integration of Theory and Practice

Industrial technologies adopt a problem-oriented integrative thinking mode, whereas traditional school education is accustomed to analytic teaching logic of progressive subject division. There are inherent cognitive-logic discrepancies between the two. The second function of vocational undergraduate colleges is to realize in-depth integration of theoretical knowledge and practical training at the teaching-implementation level, acting as a combiner linking these two modes of thinking. Such integration is not a simple addition of theoretical class hours and practical training hours; rather, it reconstructs students' cognitive paths and achieves mutual promotion and co-existence of theory and practice.

Guangdong Industry Polytechnic University has built a talent-cultivation model integrating post chain, technology chain, project chain and task chain. It disassembles knowledge modules from corporate post competence maps, converts cutting-edge industrial technologies into curriculum contents, transforms requirements of skill competitions into teaching project packages, and conducts process-oriented evaluation relying on loose-leaf work orders. It realizes that competition questions serve as teaching

plans and competition venues function as classrooms. Theoretical learning is embedded in task execution, and practical skills in turn deepen the understanding of technical principles. Hebei Vocational University of Industry and Technology has built campus “micro-factories” that fully replicate corporate production workflows and technical standards. Teaching tasks directly adopt corporate orders, and learning processes equal product-production processes. Teachers take roles similar to production-line managers, and substandard products must be reworked. The practical-training mode featuring “real-world scenarios, real-world projects and real-world standards” puts the educational slogan of “learning by doing” into regular teaching systems, enabling students to understand underlying technical principles while accomplishing production tasks.

2.3 Dynamic Adaptation to Present-day Reality and Future Development

The third function of vocational undergraduate education lies in the time dimension: it should satisfy current talent shortages of industries and cultivate students’ long-term developmental competence amid technological iteration, serving as a dynamic adapter for industrial development. This feature distinguishes it from social vocational training institutions and traditional academic universities.

Dynamic adaptation is reflected in specialty layout keeping pace with industrial development. Many domestic vocational undergraduate institutions adjust specialties along industrial chains. Hebei Vocational University of Industry and Technology lays out undergraduate specialties centering on the iron-and-steel industrial chain, while Hebei Vocational University of Science and Engineering prioritizes specialty clusters such as new-energy vehicles and equipment intellectualization. Meanwhile, a dynamic specialty-adjustment mechanism of “green-card support, blue-card upgrading, yellow-card early-warning and red-card withdrawal” has been established to update specialties according to industrial prosperity, realizing real-time

matching between talent supply and practical job demands.

Dynamic adaptation emphasizes fostering students’ transfer and innovation capabilities. Against the backdrop of rapid industrial-technology iteration, talents should not be confined to mastering fixed post-specific skills; they need comprehensive qualities to address complex and uncertain production-scenario problems. Talent cultivation of vocational undergraduate education should break the constraints of single posts, cultivate high-level compound technical and skilled talents, and attach importance to cognitive flexibility and innovative literacy. Such competences do not directly correspond to any current post, yet determine students’ occupational survival capacity and sustainable development amid technological changes, and reserve talent resources for long-term industrial growth.

3. Quality Assurance Paths Oriented toward Functional Orientation

3.1 Embedding Industrial Logic into Curriculum and Teaching

The prominent contradiction in current curriculum construction of vocational undergraduate education is that curriculum content updates lag behind industrial-technology iteration. Mere external alignment of curricula with industrial demands is far from sufficient. It is necessary to internalize industrial elements as inherent components of curriculum generation and realize embedding of industries into the whole curriculum process.

Jointly with enterprises, Henan Polytechnic University draws three maps for knowledge, skills and literacy, mapping key links of industrial chains and post competences onto the curriculum system. Teachers are encouraged to transform technical research achievements in assisting enterprises with digital and intelligent transformation into teaching cases, integrating corporate technological R&D with curriculum-resource development, thus forming a virtuous cycle in which industries guide curricula and curricula feed industries in return. Project-oriented

holistic teaching is vigorously promoted in teaching approaches, with real-world corporate production projects adopted as teaching carriers. Wuxi Vocational University of Technology adapts corporate cases into teaching projects, where students acquire knowledge and skills through project inquiry. Guangdong Industry Polytechnic University converts assessment criteria of skill competitions into curriculum standards, making daily teaching benchmark against top industrial technical specifications. Curricula are no longer closed knowledge containers, but open systems iterating through continuous interactions with industrial practices.

3.2 Teacher Development Oriented toward Dual-Capability Competence

Dual-competent teachers constitute the key support for school-running quality of vocational undergraduate education, yet vocational undergraduate education sets higher requirements for teachers than junior-college vocational education. At the junior-college level, “dual certificates” (teacher qualification certificate and vocational qualification certificate) are mostly taken as the criterion for identifying dual-competent teachers, with assessment focusing on practical operational skills. Teachers for vocational undergraduate education need to possess theoretical teaching competence, competence in guiding complex technical practices, as well as comprehensive capacity to convert industrial practical experience into teaching resources, achieving development of “dual-capability” competence.

At present, dual-competent teacher construction in many institutions remains at the statistical level. Part-time corporate teachers mostly deliver lectures, lacking channels for in-depth participation in talent-training scheme design. Suzhou Vocational University of Technology implements the “Hundred-Day Empowerment” immersive corporate practice system for teachers. Teachers take corporate practice, and are assessed on delivering implementable teaching resources, pushing them to evolve from recipients of industrial experience to

producers of teaching knowledge. Meanwhile, the teaching-staff structure is optimized. Nanjing Vocational University of Industry Technology establishes mixed teaching teams consisting of in-house teachers and corporate engineers for specialty construction. Hebei Petroleum Vocational University of Technology invites master-level skilled craftsmen into classrooms. Corporate engineers bring problem-oriented industrial thinking, which complements the knowledge-oriented teaching thinking of school teachers, and jointly shapes the unique teaching culture of vocational undergraduate education.

3.3 Promoting Governance Reform toward School-Enterprise Co-Governance

If industry-education integration remains project-based cooperation between two independent entities, dilemmas such as insufficient corporate participation motivation and unsustainable cooperation will easily arise. It is imperative to upgrade the governance mode and realize school-enterprise co-governance, so that enterprises become structural subjects of school-running rather than external consultants. Industrial colleges and industry-education consortia serve as organizational carriers for co-governance, yet the core lies in implementing rights-and-interest distribution. Henan Polytechnic University adopts the mechanism of “recruiting talents via open bidding and competitive project approval”, where school-enterprise joint teams compete for projects. Resource coordination is fulfilled via a three-director system, forming a closed-loop management covering project construction, process monitoring, application implementation and continuous diagnosis-improvement. Corporate participants are deeply involved in the whole process of curriculum construction, undertaking corresponding responsibilities and enjoying matching benefits.

In the meantime, policy incentive supply needs improvement. Although the state has introduced combined incentive policies covering finance,

taxation, land and credit, special implementation rules targeting enterprises still need refinement. Colleges and universities should take initiative to align with local policies, advance incentive measures such as tax deductions and credit-evaluation linkage for corporate investment in talent cultivation, and transform school-enterprise co-governance from moral appeals into interest-driven actions, stimulating enterprises' endogenous motivation for in-depth participation in vocational undergraduate education.

4. Conclusion

The developmental dilemmas of vocational undergraduate education mostly stem from ambiguous functional orientation rather than external competition. If it fails to demonstrate academic advantages comparable to general undergraduate education and meanwhile loses the distinct technical-skill cultivation characteristics of vocational education, it will lose its value as categorized education. From the perspective of industry-education integration, vocational undergraduate education lies at triple boundaries: industry-education boundary, theory-practice boundary, and present-future boundary. Instead of simply tilting toward any single side, it should build a brand-new advanced vocational-education form within these boundary zones.

Correspondingly, the quality-assurance paradigm needs to shift from "compliance review" to "industry adaptation". Traditional quality assurance focuses on input-end inspections of school-running conditions and documentary materials. Under the industry-education-oriented framework, quality assurance pays more attention to process ecology: whether curricula are truly embedded in industrial practices, whether teachers' dual-capability literacy matches training objectives, and whether the governance system guarantees substantive industrial-subject participation in school-running. Vocational undergraduate education is still in its initial stage of categorical formation, and explorations on its functional orientation and quality-assurance system will keep advancing. The real quality of

vocational undergraduate education is reflected in the depth of its interaction with industries, students' competence in solving real-world complex problems, and graduates' long-term sustainable occupational development. These constitute core inspirations brought by industry-education integration to the construction of vocational undergraduate education.

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