

Industry-University Integration in Action: Theorizing and Developing Modern Industry Colleges for Application-Oriented Universities

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Abstract: The modern industry college serves as a crucial vehicle for deepening industry-university integration and fostering organic connections between higher education and industrial development. It is also a key initiative for the transformative development of application-oriented universities. Drawing on existing research findings and practical experiences in modern industry college construction, this paper focuses on the developmental characteristics of application-oriented universities in Western China and takes the Digital Economy and Modern Service Industry College—a collaborative entity jointly established by Chongqing Institute of Engineering, the Chongqing E-commerce Association, and relevant enterprises—as a typical case study. From a pedagogical perspective, it systematically explores the value principles, practical challenges, and promotion strategies involved in building modern industry colleges, aiming to provide theoretical guidance and practical references for application-oriented universities to deepen industry-university integration and innovate talent cultivation models. The paper emphasizes that the modern industry college represents not only an organizational innovation in industry-university integration but also a systemic transformation in educational philosophy, curriculum systems, faculty structures, and governance mechanisms. Application-oriented universities in Western China should ground their efforts in regional industrial demands and educational realities, thus promoting a shift in educational logic from a "discipline-oriented" approach to an "industry-demand-oriented" one.

Keywords: Modern Industry College; Industry-University Integration; Applied

Universities; Educational Governance; Talent Development Model; Universities in Western China.

1. Introduction: The Modern Transformation of Industry Colleges as an Educational Organizational Form

Driven by the dual imperatives of high-quality development in higher education and industrial transformation in the new era, the modern industry college has emerged as a vital nexus connecting the education chain, talent chain, industry chain, and innovation chain[1]. National development strategies have explicitly emphasized deepening industry-education integration and promoting the integration of science and education—core policies aimed at addressing the mismatch between higher education output and industrial talent demand, especially in underdeveloped western regions. The Ministry of Education and the Ministry of Industry and Information Technology jointly issued the "Guidelines for the Construction of Modern Industry Colleges (Trial)" [2], providing policy direction for application-oriented universities to explore new types of educational entities. From a pedagogical standpoint, the industry college is not merely a practical platform for integration but also a systemic innovation in university organization, educational models, and governance structures. Its construction involves multi-dimensional educational reforms, including updates in educational philosophy, restructuring of curriculum systems, development of teaching staff, and institutional mechanism reforms. Particularly for application-oriented universities in Western China, modern industry colleges represent a crucial means to align with initiatives like the "Belt and Road" and the western regional development initiatives, addressing the contradiction between insufficient regional talent supply and the

demand for industrial upgrading. Their construction quality directly impacts the synergistic development efficacy of higher education and the regional economy in Western China.

2. Theoretical Foundation: The Pedagogical Connotation of Industry-University Integration and the Positioning of Industry Colleges

Industry-University Integration is fundamentally an educational philosophy and practical pathway that combines education with social production practices. Its theoretical origins can be traced to John Dewey's "learning by doing" philosophy, Huang Yanpei's vocational education theory, and contemporary theories such as the "Entrepreneurial University" and the "Triple Helix Model." In terms of organizational attributes, the modern industry college belongs to the category of "industry-education integrated educational organizations." Its core characteristics include [3]

2.1 Transformation in Educational Logic

The shift from disciplinary logic to industrial chain logic, emphasizing the practicality and collaborative nature of knowledge impartation and capability cultivation.

2.2 Multi-stakeholder Collaboration

Constructing an educational ecosystem of "government, industry, enterprise, and university" co-governance, promoting a shift from a single university entity to multi-stakeholder collaboration.

2.3 Integrated Functions

Integrating functions such as talent cultivation, scientific research and development, social service, and innovation & entrepreneurship, achieving deep integration between educational processes and industrial processes. For application-oriented universities in Western China, the construction of industry colleges should further emphasize the principle of "regional suitability"[4]. While adhering to core principles such as "education as the foundation, serving industry, integrated development, and mutual benefit" [3], it is essential to strengthen precise alignment with Western China's regional industrial base, resource endowment, and development strategies. This ensures the

organic unity of education's social service function, the goal of holistic human development, and the needs of regional industrial upgrading.

2.4 Theoretical Framework for This Study

Drawing on the above theories, this study constructs a theoretical framework for analyzing modern industry college construction. John Dewey's 'learning by doing' provides the pedagogical foundation for designing practical-oriented teaching activities and curriculum systems. Huang Yanpei's vocational education theory guides the alignment of talent cultivation with regional industrial needs, emphasizing the principle of 'serving industry.' The Triple Helix Model supports the design of the 'government-industry-university-enterprise' collaborative governance structure, clarifying the roles and interactions of multiple stakeholders. The Entrepreneurial University theory inspires the integration of innovation and entrepreneurship functions into industry colleges [5], promoting the transformation of scientific research achievements and the cultivation of innovative talents. This integrated theoretical framework underpins the analysis of value principles, practical challenges, and promotion strategies in subsequent sections

3. Core Value of Industry College Construction: Educational Mission and Epochal Responsibility

3.1 A Key Instrument for Implementing National Education Strategy

Responding to the policy call for "deepening industry-university integration," aligning with the talent support demands of the Western Development and "Belt and Road" initiatives, and promoting collaborative innovation among higher education, vocational education, and continuing education.

3.2 An Important Pathway for Realizing Classified University Development

Providing a differentiated and distinctive development vehicle for application-oriented universities in Western China, helping them break free from the dilemma of homogenization in development and form a complementary development pattern with eastern universities.

3.3 A Crucial Measure for Promoting

Supply-Side Reform in Education

By aligning with the demands of emerging industries like digital economy and modern services in Western China, it optimizes disciplinary structures, curriculum systems, and cultivation models, enhancing the adaptability and competitiveness of talent cultivation to resolve the dual dilemmas of regional industrial "labor shortage" and graduate "employment difficulty."

4. Diagnosis of Practical Challenges: Educational Dilemmas in Industry College Construction

Current industry college initiatives commonly face the following educational-level challenges, some of which are more pronounced in application-oriented universities in Western China [6-7]:

4.1 Lack of Macro-framework, Vague Educational Objectives

Some colleges remain at the "project application" stage, lacking long-term planning and systematic design, especially a precise positioning that aligns with regional industrial characteristics [8]. The educational function fails to be truly prominent.

4.2 Hollowing of Collaborative Education Mechanisms, Prominent "Two-Skin" Phenomenon

University-enterprise cooperation is often limited to course outsourcing or internship arrangements, failing to achieve deep integration in faculty, curriculum, research, and culture. Due to relatively weaker industrial resources, Western universities are more prone to the collaborative dilemma of "insufficient enterprise participation enthusiasm" [6].

4.3 Singular Curriculum Forms, Lagging Teaching Reform

There is a lack of innovative courses like "multiple instructors per course" and "virtual-real combination." Practical teaching still suffers from tendencies towards "simulation" and "abstraction," disconnecting from the rapid technological iteration needs of emerging industries in the West.

4.4 Imbalanced Faculty Structure, Weak Development of Dual-competence Faculty Insufficient interaction between university

faculty and enterprise instructors, lacking long-term mechanisms for mutual appointment, joint training, and resource sharing. Western universities face greater challenges in attracting and retaining dual-qualified talent with both industry experience and teaching ability due to lower regional attractiveness [7][9].

4.5 Incomplete Institutional Mechanisms, Governance Capacity Needs Improvement

The multi-party collaborative management framework, benefit distribution mechanisms, and evaluation and incentive systems are not yet fully established, affecting sustainable development. Western universities encounter more institutional barriers in cross-regional resource integration and policy alignment.

5. Promotion Strategies: Building a Systemic Project for Deep "Education-Industry" Integration

5.1 Strengthen Macro-framework, Clarify Regional Educational Orientation

Industry colleges should be incorporated into the university's overall development plan, clarifying their positioning as a "new type of educational entity." Specialized construction plans should be formulated in conjunction with regional industrial strategies (e.g., Chongqing's "Digital Economy" strategy, Yuzhong District's "4311" modern industrial system), highlighting the core educational function and regional service characteristics, and achieving a gradient progression from "pilot" to "demonstration." Establish cross-regional, cross-departmental collaborative planning mechanisms, proactively aligning with local government industrial development plans to ensure the industry college construction resonates with regional economic development [6].

5.2 Innovate Talent Cultivation Models, Promote Curriculum System Restructuring

Construct an "industry-education-research integration, multi-stakeholder collaborative" cultivation model. Promote the transformation of the curriculum system from a discipline-oriented to an industry-chain-oriented approach, developing application-oriented course clusters characterized by "virtual-real combination, project leadership, and dual-teacher instruction" [3]. Targeting Western industrial characteristics, add specialized course modules such as regional

industrial policy interpretation and cross-border e-commerce practices (aligned with the "Belt and Road"), integrating real enterprise projects and the latest industry technical standards into the entire teaching process.

5.3 Implement a Development Strategy for Disciplinary and Professional Clusters

Layout professional clusters centered on regional industrial chains in Western China, break down disciplinary barriers, promote cross-faculty and cross-disciplinary resource integration, and form an educational ecosystem with linked development of "industrial chain—professional cluster—course cluster." For example, integrating resources from e-commerce, network and new media, supply chain management, etc., around the digital economy industrial chain enhances the overall support capability for regional leading industries.

5.4 Deepen Industry-University-Research Collaboration, Build Science-Education Integration Platforms

Establish integrated "industry-university-research-transfer-innovation" practical platforms. Promote the entry of real enterprise projects into classrooms and graduation projects, realizing research feeding back into teaching and teaching boosting innovation. Fully leverage the resource integration role of industry associations, jointly building and sharing training bases with multiple enterprises to overcome the challenge of insufficient single-enterprise cooperation resources for Western universities.

5.5 Cultivate a "multi-structured faculty system" Teaching Faculty

Implement initiatives like the "Double Hundred Project" and "Industry Professor Plan" to construct a development system for "dual-qualified and dual-ability" teachers. Adopt flexible mechanisms such as "university-appointed, enterprise-employed" and "enterprise-appointed, university-employed" to attract enterprise technical backbone personnel to participate in teaching. Establish incentive mechanisms for university teachers' industry practice, supporting teachers in conducting research and technical services within local Western enterprises. Utilize East-West collaboration policies to introduce high-quality

faculty resources from the east for paired assistance.

5.6 Improve Governance Systems, Promote Digital Transformation

Establish and improve a governance structure featuring "council leadership, university-enterprise co-governance," clarifying the rights, responsibilities, and interests of government, industry, university, and enterprise stakeholders. Advance the digital transformation of teaching, constructing "virtual + real" hybrid classrooms and digital governance platforms to enhance collaborative education efficacy [10]. Utilize digital means to overcome geographical limitations in the West, enabling remote sharing of high-quality educational and industry resources from the East.

5.7 Construct a Scientific Evaluation System, Highlight Educational Effectiveness

Based on the "Guidelines for the Construction of Modern Industry Colleges" and local evaluation indicators [2], establish an effectiveness evaluation mechanism covering multiple dimensions such as professional construction, course resources, faculty development, student growth, and research services, emphasizing process-oriented and developmental evaluation. Incorporate core indicators like regional industrial service contribution and graduate local employment rates to highlight the regional service value of Western universities.

6. Case Study Insights: The Practical Exploration of Chongqing Institute of Engineering's Digital Economy and Modern Service Industry College

As a typical representative of application-oriented undergraduate universities in Western China, Chongqing Institute of Engineering, based on the needs of Chongqing's digital economy development strategy and Yuzhong District's "4311" modern industrial system construction, jointly established the Digital Economy and Modern Service Industry College with the Yuzhong District Commerce Commission, Yuzhong District Employment and Talent Center, Chongqing E-commerce Association, and multiple enterprises. This has formed a "government-industry-university-enterprise" four-party collaborative education model with Western characteristics, providing

valuable experience for industry college construction in Western application-oriented universities.

In terms of collaborative mechanism construction, the college innovatively adopted an operational model of "government linkage for platform building and services, industry association leadership for resource integration, deep university-industry-university integration, and close university-enterprise cooperation," effectively overcoming the difficulty of integrating dispersed industrial resources faced by Western universities. Led by the Chongqing E-commerce Association, no fewer than 20 enterprises were integrated to participate in order-based talent cultivation and course development. Government departments provided policy support and employment service guarantees, the university was responsible for the main work of talent cultivation, and enterprises provided practical positions, technical instructors, and real projects, forming a mutually beneficial collaborative ecosystem. At the signing ceremony, the college signed agreements and awarded plaques to the first batch of co-construction units, clarifying the responsibilities and obligations of all parties in talent cultivation, platform construction, and research services.

In talent cultivation practice, the college promoted the implementation of an "Eight Co-" education mechanism: co-discussing cultivation plans, co-forming teaching teams, co-building course resources, co-establishing practice platforms, co-evaluating cultivation quality, co-building dual-qualified faculty, co-promoting digital platforms, and co-expanding service outreach. Addressing the development needs of Chongqing's digital economy and modern service industries, it optimized the layout of professional clusters, focusing on cultivating applied talents in areas like new retail, digital marketing, chain operations, and e-commerce, aiming to achieve high-quality employment for at least 100 graduates annually. Simultaneously, it built digital training platforms and human resource service platforms, serving both in-school student cultivation and providing employee training services for regional enterprises, achieving an organic unity of educational and social service functions.

In faculty team building, the college, through flexible mechanisms like "university-appointed, shared project mentors," introduced technical

backbone personnel from enterprises in fields like live-streaming operations to participate in teaching. It also promoted joint teaching research and project development between university teachers and enterprise instructors, enhancing the quality of dual-qualified faculty development. In terms of governance, the college relied on a council to achieve university-enterprise co-governance, clarifying the relationship of rights, responsibilities, and interests among stakeholders, and established scientific benefit distribution and evaluation incentive mechanisms to ensure the sustainable operation of the industry college.

The construction practice of this college fully demonstrates that the key to success for industry colleges in Western application-oriented universities lies in: first, precise positioning based on regional industrial needs, deeply integrating industry college construction into local development strategies; second, innovating collaborative mechanisms, leveraging the bridging role of industry associations to overcome the challenge of fragmented industrial resources; third, strengthening functional integration, achieving the unified multi-value realization of talent cultivation, enterprise service, and regional development; fourth, basing efforts on Western realities, adopting flexible and diverse operational mechanisms and talent policies to compensate for shortcomings in regional attractiveness [3]. Furthermore, Chongqing Institute of Engineering simultaneously established six industry colleges, forming an industry college cluster covering digital economy, intelligent construction, smart agriculture, and other fields, further enhancing its overall support capability for regional industries. This "cluster development" approach also provides important reference for Western application-oriented universities in integrating resources and improving the efficacy of Industry-University Integration.

7. Conclusion and Outlook

The construction of modern industry colleges is a significant practice for application-oriented universities to respond to epochal demands and promote educational reform. For application-oriented universities in Western China, it is an essential path to resolve regional talent supply-demand contradictions and achieve high-quality development. The practice of Chongqing

Institute of Engineering's Digital Economy and Modern Service Industry College indicates that Western application-oriented universities must base their efforts on regional industrial realities, innovate "government-industry-university-enterprise" collaborative mechanisms, and construct talent cultivation and governance systems that resonate with regional development to propel industry colleges from "formal integration" towards "substantive integration."

In the future, Western application-oriented universities should further strengthen guidance from pedagogical theories, emphasize the essence of education, and focus efforts in the following areas: first, deepen research on regional suitability, constructing differentiated industry college models based on the industrial characteristics of different Western regions; second, strengthen digital empowerment, using digital technology to overcome geographical limitations and achieve cross-regional sharing of high-quality educational and industrial resources; third, promote the normalization of collaborative mechanisms, improve benefit-sharing and risk-sharing mechanisms, and enhance the endogenous motivation for enterprise participation; fourth, strengthen cooperation between industry colleges in Eastern and Western China, learning from advanced Eastern experiences while leveraging Western resource endowments to form a complementary development pattern. Through continuous exploration, promote Western modern industry colleges to evolve from "platform construction" to "ecosystem building," truly becoming educational highlands for cultivating high-quality applied, compound, and innovative talents, providing solid talent support and intellectual guarantees for the high-quality economic and social development of Western China. Simultaneously, interdisciplinary research should be strengthened to deepen the theoretical construction of Industry-University Integration [3,11], providing more explanatory and guiding academic support for the development of modern industry colleges with distinctive regional characteristics.

8. Limitations and Future Research

8.1 Limitations

While this study provides an in-depth analysis

of the construction of modern industry colleges within the context of Western China's application-oriented universities, it is not without limitations. First, the research is primarily based on a single, in-depth case study of the Digital Economy and Modern Service Industry College at Chongqing Institute of Engineering. Although this case is illustrative and rich in detail, its findings may not be fully generalizable to all application-oriented universities, especially those in regions with significantly different industrial structures, policy environments, or levels of economic development. The "Western China" context itself is diverse, and the challenges and strategies highlighted here may vary across provinces.

Second, the study adopts a predominantly organizational and macro-pedagogical perspective, focusing on institutional mechanisms, curriculum design, and governance models. It does not delve deeply into the micro-level educational processes within the industry college, such as the detailed dynamics of classroom interactions between enterprise mentors and university teachers, the specific impact of project-based learning on student competency development, or the longitudinal tracking of graduate career trajectories. The assessment of educational effectiveness, while proposed as a strategy, is not supported by empirical, long-term outcome data in this paper.

Third, the research relies heavily on policy documents, existing theoretical frameworks, and descriptive case analysis. It incorporates limited primary quantitative or qualitative data collected directly from key stakeholders—such as systematic surveys of students, in-depth interviews with enterprise participants, or comprehensive analyses of industry feedback. This reliance on secondary sources and institutional documentation may overlook nuanced perspectives and implementation barriers experienced on the ground.

Finally, the study is situated within a specific phase of rapid policy promotion of industry colleges in China. The findings and strategies are thus contextual to this dynamic period and may require adaptation as policies evolve, new challenges emerge (e.g., the impact of economic cycles on enterprise participation), and the model itself matures.

8.2 Future Research Directions

Future research should aim to deepen the understanding of the diverse practices and underlying mechanisms of modern industry colleges. Key directions include conducting comparative and longitudinal studies across regions and institution types to identify critical factors for sustainable development; investigating the micro-level teaching methodologies of dual-qualified instructors and the impact of project-based learning on student competency development; empirically analyzing the participation motivations and collaborative dynamics of multiple stakeholders, including enterprises and industry associations; examining how digital transformation reshapes the educational ecology and governance models of industry colleges; and strengthening interdisciplinary theoretical dialogue and construction to develop more robust academic frameworks for industry-education integration with distinctive regional traits.

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