

# An Innovative Model for Talent Development in Information Technology Industrial Colleges of Application-Oriented Universities

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**Abstract.** Against the background of a rising symbiotic relationship between industry and education, coupled with enhanced policies advocating talent-centric national development, exploring novel paradigms for talent development is of significant practical significance. This study deciphers the core attributes and barriers to nurturing talent within contemporary industrial colleges, emphasizing the joint venture of progressive and advanced educational entities. By introducing the "6+1" Innovative Talent Cultivation Model (ITCM), specifically designed for industrial IT colleges within university systems, this research provides an all-encompassing framework. This framework includes six interconnected elements: collaborative curriculum development, appropriate curriculum design, effective classroom teaching, shared access to experimental and training facilities, powerful research and innovation platforms, and the development of dual-skilled faculty that includes both academic and practical proficiency. The proposed model aims to foster the growth of skilled, application-oriented talent. Research findings demonstrate that implementation of the ITCM leads to significant improvements in both graduates employment rates and professional alignment.

**Keywords:** Modern industrial college, innovative talent cultivation model (ITCM), OBE-CDIO, blended learning, education-industry integration, collaborative educational initiatives.

## 1 Introduction

Talent cultivation is the fundamental purpose and ultimate responsibility of higher education institutions, whose success in this endeavor is the very lifeblood of tertiary education<sup>[1]</sup>. All institutional efforts must focus on nurturing talent and facilitating learners' development and success. The Ministry of Education, in collaboration with other relevant departments, has issued the "Pilot Guidelines for the Construction of Modern Industrial Colleges" (hereafter referred to as the "Construction Guidelines"). These guidelines state unequivocally that the primary objective of establishing modern industrial colleges is to create exemplary institutions dedicated to talent development. These colleges function as critical hubs for strengthening the integration of education and industry, thereby promoting collaborative educational efforts.

The joint establishment and management of modern industrial colleges represents an innovative approach to the comprehensive development of high-quality talents that meet the requirements

of modern industrial advancement. This strategy plays a pivotal role in achieving high-quality educational progress within the framework of education-industry integration. By fostering strong collaborations between academia and industry, these colleges effectively blend theoretical knowledge with practical applications, thereby enhancing the overall effectiveness of talent development efforts.

## 2 Connotation of Talent Cultivation

Cultivating high-quality talent aligned with the evolving exigencies of modern industry is an essential prerequisite for driving productivity improvements and societal progress. In the context of implementing an education-industry integration strategy, the establishment of modern industrial colleges effectively bridges the gap between talent cultivation and industrial advancement. This novel effort not only strengthens nations through education and talent development, but also serves as a fresh impetus for promoting industrial upgrading and transformation.

Scholars such as Alanna Klingstrom<sup>[2]</sup> have delved into the significance of education-industry integration in enhancing the quality of talent cultivation and strengthening national competitiveness. Studies by researchers including Valentín<sup>[3]</sup> and Govender<sup>[4]</sup> further underscore the profound influence of education-industry integration on student employability and entrepreneurial potential. Therefore, in the field of modern industrial colleges, it is imperative to achieve seamless "school-enterprise integration" while strengthening the leadership role of enterprises. This means building a cohesive ecosystem that facilitates multi-party collaborative education, exploring innovative talent development mechanisms aligned with national and regional economic development needs, and enhancing talent development quality to meet the escalating demands of today's dynamic business landscape.

As industrial sectors undergo transformation, talent development emerges as a critical component intrinsically linked to educational innovation and advancement. With the modern industrial structure increasingly relying on technology-intensive human capital, adapting to the development imperatives of emerging technologies and business models becomes paramount. Traditional industries, propelled by technological revolutions, are transitioning to digitalization and intelligence, necessitating a shift in the talent landscape where intelligent robots are gradually replacing conventional assembly line workers.

The "National Pilot Implementation Plan for Education-Industry Integration", co-published by six agencies, including the Ministry of Education, envisages the creation of about **50** pilot cities and the fostering of more than **10,000** enterprises skilled in integrating education and industry. This highlights the rise of education-industry integration as a national high-quality development strategy. Leveraging policy directives, modern industrial colleges adopt enterprise-style management, contemporary governance structures, and market-oriented operational mechanisms to steward resources from diverse stakeholders, including governments, industries, schools, and enterprises. This collaborative approach aims to create an integrated and innovative talent development model tailored to the requirements of modern industries.

Modern industrial colleges occupy a pivotal position in innovating talent cultivation paradigms, refining talent cultivation standards, augmenting the innovation and development capabilities of key regional industries, and catalyzing the development of high-quality education

development<sup>[5]</sup>. By assimilating innovative elements such as talent, funding, technology, and management, these colleges transcend traditional models of talent cultivation models<sup>[6]</sup>. They overhaul curriculum content, deploy joint teaching methods, develop cutting-edge talent development programs, and nurture teachers with both academic knowledge and practical expertise. This deep integration breaks down silos among various stakeholders, generates innovative talent cultivation frameworks, and exerts a significant influence on driving educational innovation and development.

### **3 Bottlenecks in Talent Cultivation**

The talent cultivation model adopted by China's industrial colleges is still in its nascent stage of exploration. Various scholars, such as Xiao Biyun<sup>[7]</sup>, Ke Ting<sup>[8]</sup>, Yu Yi<sup>[9]</sup>, and Lin Jian<sup>[10]</sup>, have pointed out the challenges inherent in the talent development process of these institutions. They highlight systemic deficiencies in education-industry integration, conflicting interests among stakeholders, and mismatches in talent development frameworks. The predominance of university-led administrative management, coupled with a lack of corporate consciousness, creates obstacles to establishing a mutually beneficial and shared environment among stakeholders. This, in turn, hinders the full recognition and realization of the leading roles of enterprises.

According to Lu Xiaozhong, Dean of the Institute for Higher Education Development in the Guangdong-Hong Kong-Macao Greater Bay Area at South China Normal University, the essence of integrating education with industry and research lies in talent cultivation. He posits that building a community of talent cultivation that unites universities, industries, and enterprises is a pressing concern for the advancement of industrial colleges. The real impetus for the advancement of higher education and regional economies through industrial colleges can only be achieved if the talent cultivation system is aligned with industrial development needs through a two-way dialogue. However, a persistent disconnect between education and industry continues to plague the evolution of industrial colleges. This disconnect stems from the uneven distribution of interests among multiple governance stakeholders and the universities' inadequate self-sustainability.

Despite some progress, many industrial colleges continue to adhere to traditional hierarchical "academic" management structures. While some universities have established multi-stakeholder councils—including governments, enterprises, and industry associations—and have developed operational guidelines for these bodies, they often remain peripheral rather than central to the college's management hierarchy. This marginalization results in limited input into the construction of the talent cultivation system. At present, a long-term, value-community-based operational mechanism remains elusive, impeding the profound development of school-enterprise collaboration and the sustained promotion of education-industry cooperative education<sup>[11-12]</sup>.

### **4 An Innovative Talent Cultivation Model**

Against the background of strengthening the nation through education and deepening the integration of industry and education, we introduce an innovative "6+1" model for talent development in information technology industry colleges of applied undergraduate universities (as illustrated in Figure 1).

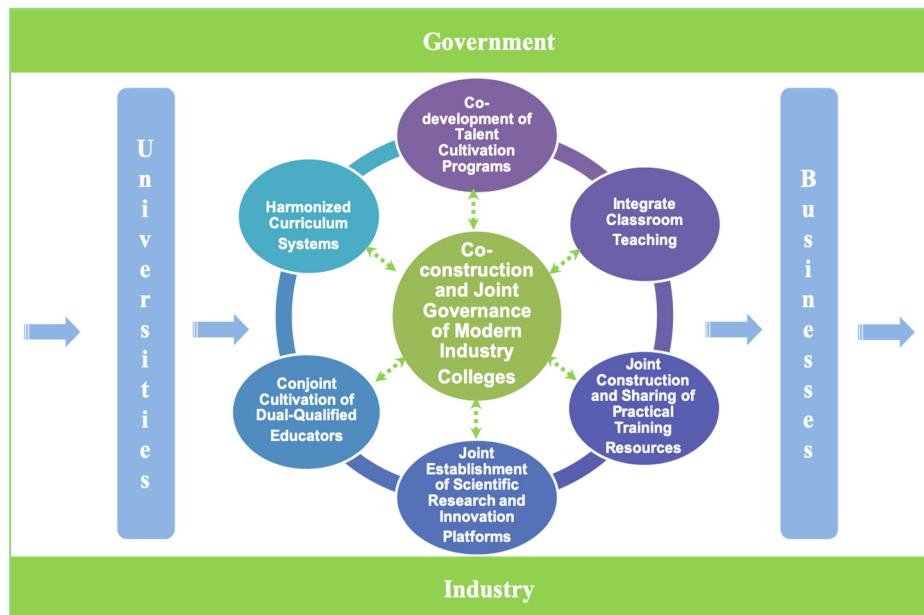


Fig. 1. "6+1" Innovative Talent Cultivation Model(ITCM)

#### 4.1 Co-development of Talent Cultivation Programs

Under the auspices of the government and industry, a joint effort between schools and enterprises formulates the talent cultivation program for IT industry colleges within applied undergraduate universities. Students undergo university studies for the first three years and then immerse themselves in a fourth-year integrated practical training in centralized industry education, completing their final-year projects within the Industrial College Park. This approach substantially extends the period of enterprise internships and practical training for students, ensuring a smooth transition between academic and employer expectations.

#### 4.2 Harmonized Curriculum Systems

The curriculum philosophy of IT modern industry colleges in applied undergraduate universities adopts a practice-oriented paradigm, diverging from the conventional "theory first, practice later" format. It advocates learning theory through hands-on practice, iteratively reinforcing knowledge through a "practice-theory-practice" cycle. Leveraging project- and task-driven teaching methods, the curriculum integrates real-world project resources from enterprises and university-based practical teaching experiences to re-engineer teaching content and co-create curriculum systems with industry partners.

#### 4.3 Integrated Classroom Teaching

Adhering to the OBE-CDIO principle and the matrix of graduation requirements, the CDIO teaching model, which stands for Conceive (C), Design (D), Implement (I), and Operate (O), is used to decompose engineering projects and reconstruct teaching content. Innovative teaching models such as blended online and offline learning and the flipped classroom are employed to

break down and restructure engineering projects, adjust teaching content, and carefully select real engineering cases closely related to the subject matter to organize practical teaching and training.

#### 4.4 Joint Construction and Sharing of Practical Training Resources

IT industry colleges embrace a collaborative education model of "government+ industry+ university+ business". This model involves active collaboration among stakeholders in the establishment of on- campus and off-campus practical training facilities and the co-development of practical training materials. Based on the evolving knowledge capacities and skill profiles of students across different academic stages, a phased and tiered strategy is adopted to create a reservoir of experimental and practical training resources.

#### 4.5 Joint Establishment of Scientific Research and Innovation Platforms

Innovation has emerged as a cardinal driver of enterprise progress; hence, the co-construction of key laboratories and innovation hubs, among other scientific research platforms, is a critical component of the talent cultivation framework at the Information Technology Industry College. These platforms are designed to nurture students' holistic abilities and elevate the competence of enterprise employees by offering authentic, scenario-based, and real-world engineering environments conducive to tackling practical engineering challenges.

#### 4.6 Conjoint Cultivation of Dual-Qualified Educators

Educators are the bedrock and fountainhead of education, representing the cornerstone for delivering quality education. Universities and enterprises join forces to establish "dual-qualified educator" training bases aimed at breeding a proficient and professional teaching cadre. Enterprises articulate management and technical challenges, provide research funding, and universities facilitate project initiation and administration, setting up targeted research agendas. Through the Information Technology Industry College as an interface, both parties work together to resolve these challenges.

## 5 Evaluation Results and Analysis

### 5.1 Data of Graduates

The distribution of graduates across various disciplines is detailed as follows: Table 1 provides a comprehensive breakdown of the graduates from the Industrial College for the years 2022 and 2023. The data is categorized by gender and academic program, offering insights into the demographic composition of the graduating classes.

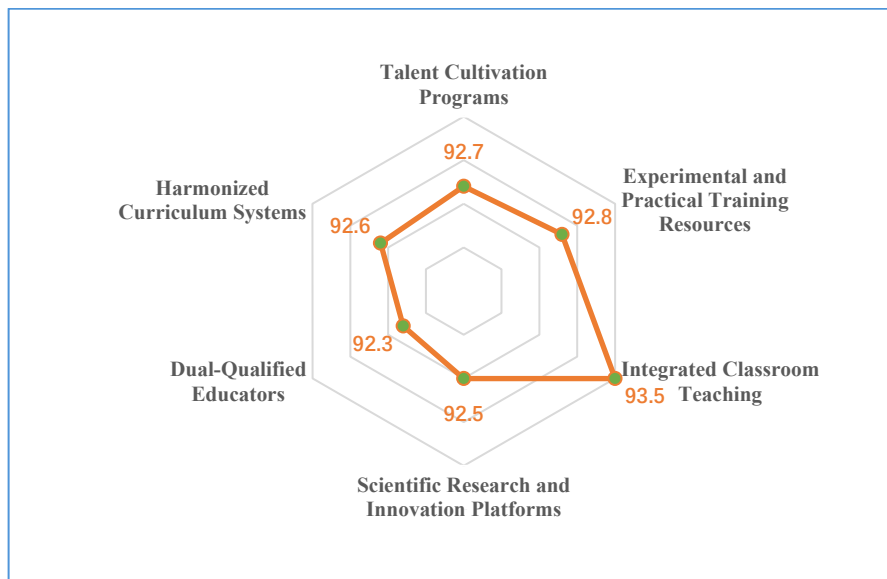
**Table 1.** Graduate distribution by discipline and gender

Majors	# of graduate (2022Y)		# of graduate (2023Y)	
	Male	Female	Male	Female
Electronic Information Technology	109	11	83	11
Computer Science	158	25	125	37
Software Engineering	174	20	162	28
Digital Media Technology	71	52	56	65

Electrical Engineering	N/A	N/A	69	6
SubTotal #	512	108	495	147
Total #	620		642	

## 5.2 Model Evaluation

ITCM was evaluated across six critical dimensions, with a total of **576** valid responses collected from graduates. Each dimension was scored out of a maximum of **95**, and the results were visually presented using a radar chart to illustrate the performance in Figure 2.



**Fig. 2.** ITCM assessment radar chart

In the dimension of "Talent Cultivation Program," the model achieved a score of 92.7, indicating a high level of endorsement for its effectiveness in nurturing talent. The "Harmonized Curriculum System" received a score of 92.6, reflecting the respondents' recognition of the curriculum's comprehensiveness and coherence. "Experimental and Practical Training Resources" were rated at 92.8, demonstrating the effective integration of practical components with theoretical knowledge.

The "Dual-Qualified Educators" dimension scored 92.3, indicating that the professional expertise and teaching abilities of the instructors are generally high. The "Integrated Classroom Teaching" dimension garnered the highest score of **93.5**, signifying that the combined classroom environment and pedagogical approaches have yielded significant positive outcomes, providing students with an enriched learning experience.

## 5.3 Professional Alignment Rates

Figure 3 illustrates a comparative overview of the professional alignment rates of graduates for the years 2022 and 2023 under ITCM. The professional alignment rate is defined as the

proportion of graduates' jobs that are related to their field of study, serving as an indicator of the degree of alignment between education and market demands.

The chart reveals that all listed majors had high professional alignment rates in 2022, with the Software Engineering major leading at 91.8%. This high rate indicates a strong match between the talents cultivated in this program and the needs of the industry. For the year 2023, the alignment rates for majors such as Computer Science, Electronic Engineering and Digital Media Technology remained above 85%, demonstrating that graduates from these fields are effectively meeting the market's demand for specialized technical talent.

The Electrical Engineering showed a significant increase in alignment rate from 71.6% in 2022 to 83.9% in 2023. This improvement is attributed to the deep integration of industry and education practices within the major, including the recruitment of several high-level industry engineers as instructors and the sharing of experimental and training resources. These measures have significantly enhanced the major's alignment with industry needs, thereby increasing the professional relevance of its graduates.

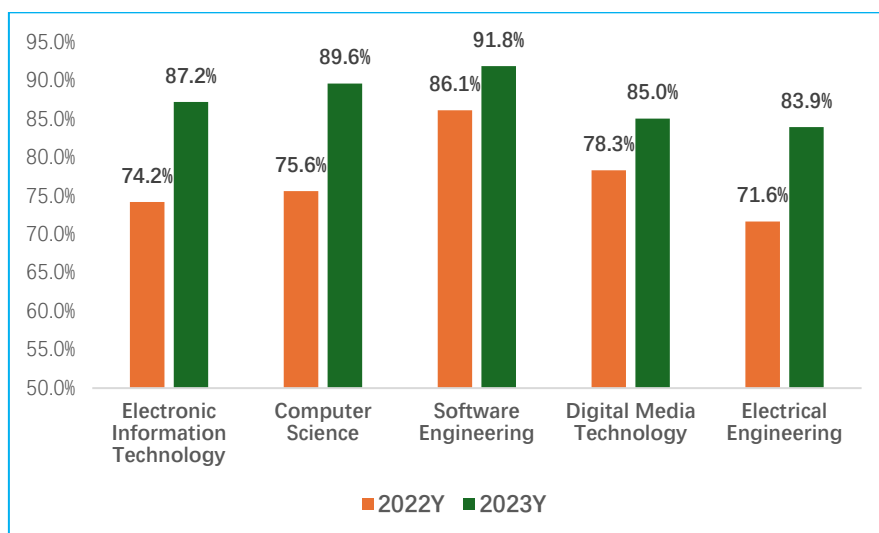


Fig. 3. ITCM enhancement on professional alignment rates

## 6 Conclusion

Deepening the integration of industry and education, and jointly constructing and managing modern industrial colleges represent innovative measures to comprehensively cultivate high-quality talents that meet the needs of modern industrial development. In 2022, the Industrial College cultivated a total of 620 graduates, consisting of 512 male and 108 female students. In 2023, the number of graduates increased by 22, bringing the total to 642, with 495 male and 147 female students. Survey results indicate that graduates highly recognize the new talent cultivation model, with scores above 92 points in each talent cultivation dimension. Practice has proven that the employment rate of graduates has increased by 5% after adopting this new talent cultivation model. In 2023, the average professional match rate improved by 10.3% compared to

2022, reaching 87.5%. The Electrical Engineering program, benefiting from the in-depth implementation of the new talent cultivation model over the past two years, saw a 12.3% increase in the professional match rate in 2023, reaching 83.9%. The Software Engineering program has consistently promoted the implementation of the new talent cultivation model, maintaining a high professional match rate, with a rate of 91.8% in 2023.

The new talent cultivation model has made active explorations in the scientific and forward-looking aspects of talent cultivation, having a very positive effect on the employment rate and professional match rate. It has promoted the reform and innovation of talent cultivation models in the field of information technology, and has supported the implementation of the strategy for the integration of education and industry as well as the strategy for a talent-strong country.

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