

# **The Reconfiguration and Implementation of the Applied Talent Cultivation Paradigm under the Context of Industry-Education Integration**

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**Abstract:** Industry-education integration, a strategic bridge connecting the realms of education, talent development, industry dynamics, and innovation initiatives, stands as the pivotal pathway in resolving the inherent structural contradictions between talent cultivation and the evolving needs of industries. This study delves into the intricate and enduring collaboration between Hanshan Normal University and ChaoZhou Three-circle (Group) Co., Ltd., employing a case study approach to meticulously dissect the systematic reform initiatives undertaken by both entities. Areas scrutinized include the establishment of collaborative educational mechanisms, the revamping of curriculum frameworks, the innovation in practical teaching methodologies, the reciprocal empowerment of teaching faculty, and the multidimensional expansion of educational platforms. Not only does this study analyze the tangible outcomes of these reforms in bolstering students' practical expertise, elevating the quality of talent nurture, catalyzing the transfer of research outcomes into practical applications, and enhancing societal engagement capabilities, but it also delves into the entrenched impediments and challenges present at various levels such as collaborative frameworks, resource allocation dynamics, and factors influencing the motivation of educators and students. Building upon these insights, a series of precise and implementable optimization strategies are delineated, with the primary aim of providing replicable and widely applicable paradigms and theoretical perspectives for akin institutions seeking to deepen industry-education integration and establish robust frameworks for cultivating top-tier applied talent.

**Keywords:** Industry-Education Integration; Applied Talents; Practical Teaching; Collaborative Student Development; Academic-Industry Partnership

## **1. Introduction**

Currently, the global economic landscape is undergoing profound adjustments, with emerging technologies such as artificial intelligence, big data, and new materials driving rapid iterations and imposing unprecedented demands on the knowledge structure and skill set of workers. In this context, higher education reform in China has ventured into uncharted territory. The emergence of the concepts of "new engineering fields" and "new liberal arts disciplines" signifies a shift in the objectives of talent cultivation from traditional academic and research-oriented approaches towards applied, interdisciplinary, and innovative paradigms [1]. Nonetheless, the persistent phenomenon of a stark misalignment between the talent nurtured by universities and the actual needs of industries continues to linger, manifesting in deficiencies in practical skills among graduates, and the coexistence of structural contradictions between the challenges of "employment difficulty" for university students and the "labor shortage" experienced by enterprises.

As a mode of talent cultivation aimed at breaking down the barriers between academia and society, facilitating the mutual permeation of educational and production elements, industry-education integration lies at the core of constructing a collaborative educational community involving universities, enterprises, governments, and industries. Through fostering resource sharing, complementing strengths, sharing risks, and achieving mutual benefits [2], this model not only serves as an intrinsic requirement for enhancing the quality of higher education but also acts as an imperative choice

in serving the nation's innovation-driven development strategy and advancing high-quality socio-economic growth at the regional level. Hanshan Normal University, as a local teacher training institution, actively aligns its Inorganic Non-metallic Materials program with the local pillar industry—the Chaozhou ceramics industry—and has engaged in profound collaborations with industry-leading enterprise ChaoZhou Three-circle. This partnership provides an excellent vantage point for observing how industry-education integration transitions from mere concepts to practical implementation and from formalities to substance. This study aims to delve into the depths of their collaborative efforts, systematically delineate their reform logic, decipher the keys to their success, reflect on the challenges encountered along their journey, and ultimately contribute a wealth of grassroots experiential insights and rational contemplation to the practical teaching reform in Chinese higher education for the new era.

## **2. Top-Level Design and Multi-dimensional Practical Reform in Industry-Education Integration**

The collaboration between Hanshan Normal University (HNU) and ChaoZhou Three-circle transcends sporadic, project-based short-term endeavors; rather, it embodies a comprehensive educational endeavor meticulously crafted through top-level design and systematic advancement. The reform initiatives encompass a holistic and end-to-end approach ranging from curriculum to faculty, from classrooms to enterprises, and from learning to employment.

### **2.1 Curriculum System Reconstruction - Shifting from Disciplinary Logic to Industry Logic**

Where traditional curriculum systems adhere to disciplinary knowledge logic, industry-education integration necessitates a shift towards industry-demand logic in curriculum construction. Consequently, the institution initiated curriculum "addition and subtraction". Collaboratively, professional educators, ChaoZhou Three-circle technical experts, and human resources personnel formed a curriculum reform committee. Aligning with the competency requirements of positions along the ceramic industry chain, the committee reconstructed the curriculum map. Redundant theoretical content

detached from industry advancements was trimmed while practical teaching hours were augmented. For instance, in the course "Practical Ceramic Manufacturing Processes", key processes from ChaoZhou Three-circle's production line were transposed into instructional projects, enabling students to "learn by doing" and "do by learning". Furthermore, the institution facilitated seamless integration between course content and real-world projects. Taking the lateral project "Research on the Performance Analysis of Fuel Cell Plates (Materials)" as an example, critical technical challenges such as the characterization of novel ceramic material microstructures within the project were broken down and integrated into the core curriculum teaching cases of Material Analysis and Testing Techniques. Students engage with real technical challenges companies are tackling in the classroom, fostering interest and a desire for exploration through practical application. This exposure enables students to grasp industry-leading technological developments before graduation, fostering initial capabilities to tackle complex engineering problems. These reform initiatives effectively facilitate industry-education integration, enhancing students' practical aptitude and cognitive grasp of cutting-edge technologies.

### **2.2 Progressive Innovation in Practical Teaching Mode: Advancing from Cognitive Engagement to Deep Integration**

At the heart of industry-education integration lies practical teaching. The Inorganic Non-metallic Materials program has forged a structured, progressive model of practical teaching that transitions students from cognitive understanding to active involvement, from simulation to real-world application [3].

As students embark on foundational coursework, the college orchestrates visits to ChaoZhou Three-circle. Here, enterprise technicians metamorphose into "enterprise mentors", guiding students through crucial areas like production workshops, elucidating the entire production process from raw materials to precision ceramic components. Students engage with inquiries during these visits, delving into process principles, parameter control, and recording pertinent details. Upon returning to the classroom, these firsthand experiences serve as vivid reference points for theoretical learning, amplifying the impact of their studies.

Serving as the core of practical teaching, the "HNU Three-circle Class" enables third and fourth-year students to partake in on-site internships at enterprises. Assuming quasi-member roles within project teams, under the guidance of enterprise mentors, students delve into specific projects such as optimizing dielectric performance of new capacitors. Through the application of professional knowledge, they design solutions, analyze data, and propose improvements, not only honing their technical skills but also nurturing abilities in teamwork and collaboration.

The institution advocates for a "dual-mentor system", providing students engaged in industry-education integration projects with both academic and enterprise mentors. While academic mentors focus on theoretical knowledge and academic planning, enterprise mentors emphasize practical skills and vocational guidance. These two mentors engage in regular communication to tailor development plans for students and address practical issues. During the capstone project phase, the advantages of this system shine through as student topics stem from real-world internship challenges. Guided from different angles by the dual mentors, students produce results that blend theoretical depth with tangible value. Notably, some outstanding outcomes are directly adopted by enterprises.

### **2.3 Cultivating a Pedagogical Force of "Dual-Qualified" Educators**

Educators stand as the linchpin to the success of industry-education integration. A cadre of educators possessing dual proficiency in both theory and practice, adept at both teaching and research, forms the fundamental bedrock of reform [4]. Hanshan Normal University, through a blend of outreach and engagement strategies, is fervently crafting such a distinguished faculty lineup.

At the heart of this initiative lies the concept of educators engaging in industry secondments. The institution has introduced policies to incentivize and support professional educators, especially young faculty members, to partake in half-year to year-long secondments within the research and development departments or production lines of ChaoZhou Three-circle. During these placements, educators assume temporary roles as research associates or engineers within the enterprise, immersing

themselves in active projects. This experience not only offers educators a firsthand understanding of the industry's technological bottlenecks and developmental trajectories, refreshing their reservoir of knowledge. Importantly, they return with a trove of vibrant enterprise cases, engineering data, and project experiences. These premier instructional resources swiftly integrate into lesson plans, course materials, and experimental designs, significantly enriching classroom instructional content and bridging the gap between academia and the workshop floor.

The pivotal aspect of this endeavor involves the aggregation of corporate wisdom [5]. The university engages senior engineers, technical directors, HR experts from ChaoZhou Three-circle as adjunct professors or industry mentors. These professionals either deliver a series of lectures for students on topics such as "Cutting-edge Ceramic Materials Technology" and "Trends in the Electronic Components Industry", acquainting students with the latest industry dynamics and authentic corporate demands. Alternatively, they actively participate in curriculum design and teaching activities, preempting the human resource standards and talent competencies demanded by enterprises throughout the entire talent development process. This infusion of the "voice of industry" effectively mitigates the haphazardness in talent cultivation, ensuring the precision of developmental orientations,

### **2.4 Establishing a Comprehensive Growth Support System**

In addition to curricula, hands-on experience, and faculty strength, there is a commitment to constructing a multi-dimensional educational platform to bolster students' holistic development. Primarily, there is the establishment of an integrated system mechanism. Collaboratively envisioned by both academia and industry, the "Science-Industry-Education Integration Collaborative Student Development Committee" is instituted, helmed by leaders from both sides, convening regularly to harmonize cooperative directions and tackle pivotal issues. This mechanism ensures long-term collaboration, facilitating efficient alignment and sharing of academic and industrial resources. Secondly, there is a drive towards innovating and integrating graduation and employment phases. The "HNU Three-circle

Class" amalgamates graduation internships with thesis research, intertwining topics with practical enterprise applications, under the guidance of dual mentors. Students, during their internship and research period, immerse themselves in the corporate culture, often securing positions post-graduation, effectuating a seamless transition from campus to the professional realm. Lastly, there is an emphasis on fortifying a progressive practical teaching chain. Practical education threads through the university's four-year span: freshmen and sophomore courses involve internships and cognitive practicums to nurture interests; junior years focus on professional production internships to master core skills; senior years encompass graduation internships and thesis research to cultivate integrated innovative capabilities. This systematic approach aligns with cognitive principles, safeguarding instructional effectiveness.

Furthermore, the institution avidly utilizes subject competitions as a conduit to empower student innovation and entrepreneurship. By organizing student participation in esteemed competitions like the "Challenge Cup", "Metallographic Skills Competition", and "Materials Innovation Competition", students are directed to transform classroom learning and corporate insights into innovative projects. The college and enterprises jointly offer technical guidance, venue support, and financial aid to competing teams, fostering a conducive atmosphere of "learning through competition, driving innovation, and fostering transformation". Many competition projects not only garner accolades but also incubate nascent projects with market potential, paving novel pathways for students' future career trajectories.

### **3. Reform Achievements and Intrinsic Challenges**

Following years of exploration and practice, the remarkable achievements in the integration reform between Hanshan Normal University and ChaoZhou Three-circle have been notable, yet there exist several profound issues that urgently require resolution.

#### **3.1 Multifaceted Showcasing of Significant Achievements**

For students, structured practical teaching liberates them from mere theoretical discourse, endowing them with solid hands-on skills and the ability to resolve real-world challenges [6].

During internships, they autonomously undertake research and development tasks, design processes meeting industry standards, thereby elevating their professional competence and holistic qualities. The "HNU Three-circle Class" has become the hallmark of the university. Graduates are recognized for their quick adaptability, lasting potential, and retention by employers. Over recent years, the employment rate of graduates from this program in renowned enterprises has continuously surged, with many individuals evolving into technical stalwarts or project managers within one to two year(s) post-graduation, embodying high-quality employment. In the realm of academia-industry collaboration, barriers between university research and market demands have been shattered. Research projects led by faculty stem from practical industry needs, swiftly translating outcomes from the laboratory to the production line, such as advancements in fuel cell research enhancing the competitiveness of enterprise products. The institution nurtures talent for local industries, provides essential services, bolsters the upgrade of Chaozhou's ceramic industry, and enhances the capacity to serve regional social development.

#### **3.2 Profound Challenges on the Path Forward**

Primarily, the distinct legal entities of academia and industry pose a deep-rooted challenge. While universities prioritize education and focus on teaching and student learning outcomes, businesses prioritize profit, emphasizing production efficiency and effectiveness. This discrepancy often leads to frequent conflicts in internship arrangements and necessitates the immediate establishment of a sustainable cooperative mechanism that balances the interests, shared risks, and benefits of both parties. Secondly, the success of integration has led to an increase in participating students, yet there is an inadequate resource expansion. The limited availability of suitable internship positions and projects in enterprises contrasts with the substantial financial investment by the university. The slow pace of updating practical teaching equipment, especially advanced equipment, fails to meet demands, hindering the dissemination of reform. Furthermore, some students perceive practical teaching as encroaching upon time reserved for postgraduate exams or public service examinations, indicating an inadequate

appreciation of its value. This originates from the existing evaluation system where the significance of practical performance and outcomes in academic overall grades, scholarship assessments, and the like, is minimal, lacking in effective incentives. Lastly, the integration presents elevated demands on educators, necessitating significant investment of energy. However, within the current management system of higher education institutions, these efforts struggle to receive full acknowledgment in workload calculations, title assessments, and evaluation systems, resulting in an imbalance between input and rewards, thereby potentially impacting the sustainability of reform efforts.

#### **4. Strategies for Deepened Reform and Future Prospects**

##### **4.1 Enhancing Top-level Design, Constructing a Symbiotic and Collaborative Ecological System**

It is proposed to elevate the existing "Coordination Committee" to a "Strategic Council for Industry-education integration" composed jointly by senior executives from academia and industry, representatives from government education authorities, and industry associations. This council would be responsible for devising long-term cooperative strategies, approving significant collaborative projects, and exploring the establishment of benefit-sharing mechanisms based on contributions. For instance, contributions such as hosting student internships and offering equipment support by enterprises could be converted into certain "educational credits". In return, universities could reciprocate through prioritizing the transfer of research outcomes and providing tailored employee training, fostering a mutualistic relationship of interdependence [7].

##### **4.2 Expanding Resource Channels, Constructing a Practical Platform Combining Virtual and Physical Elements**

On one hand, proactive efforts should be made to secure special funding support from provincial and municipal governments to co-build high-level internship bases and laboratories. On the other hand, embracing digital technologies vigorously entails collaborating with enterprises to develop virtual simulation lab

projects. Through technologies like VR/AR, students can simulate operations in virtual environments for pricey, high-risk, or intricate processes, serving as an effective complement to physical internships. This approach transcends spatial limitations, enabling more students to benefit from high-quality practical teaching resources.

##### **4.3 Restructuring Evaluation Systems, Igniting Intrinsic Motivation for Teacher and Student Engagement**

For students, establishing an independent practical teaching credit system operating parallel to theoretical courses is essential. Practical outcomes (such as project reports, patents, competition awards, and enterprise evaluations) should serve as the core basis for academic assessments, awards, recommendations for employment, incentivizing student participation. Regarding educators, educational institutions should introduce dedicated incentive policies, incorporating activities like guiding student practices, developing industry-education integration courses, and transforming research outcomes into title assessments, position evaluations, and performance allocations. Special incentive funds should be established to recognize educators who make outstanding contributions to industry-education integration, securing both honor and material gains.

##### **4.4 Reinforcing Cultural Integration, Cultivating a Shared Value Identity in Collaborative student development**

The ultimate success of industry-education integration transcends mere institutional and technological fusion; it encompasses cultural integration as well. Universities should offer courses on corporate culture, organize open-house events for companies, and invite exceptional company employees to share their experiences, allowing students to grasp and embrace corporate culture in advance [8]. Companies, recognizing the acceptance and nurturing of students as integral parts of their social responsibilities and future talent strategies, should foster an open, inclusive, and supportive learning atmosphere. When both academia and industry converge on shared values and cultural identities, industry-education integration can truly transition from mere "physical juxtaposition" to a synergistic "chemical

reaction".

### 5. Conclusions

The collaborative integration practice between Hanshan Normal University and ChaoZhou Three-circle (Group) Co., Ltd. emerges as a triumphant exploration, wherein a local applied university actively serves the regional industry and innovates talent development models. Through systematic reform measures, this endeavor has validated the immense value of industry-education integration in enhancing the quality of talent cultivation, facilitating student employment, driving research conversion, and supporting local development. Despite encountering various challenges in the process of deepening cooperation, including mechanisms, resources, and motivations, the synergistic educational paradigm established through top-level design, multidimensional linkage, and platform construction undoubtedly offers a significantly influential practical template for higher education reform in China.

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