

# Study on CNC Practical Training Teaching Reform under the Background of Industry-Education Integration: Taking Rui 'an College as an Example

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**Abstract:** Rui 'an College is a full-time vocational college serving the county economy. According to the talent demand of local enterprises, the college closely integrates industry and teaching to optimize the teaching integration, and at the same time respects the individual differences and autonomy of students in learning, forming a new teaching mode. Taking the mechanical design and manufacturing major of Rui 'an College as an example, this paper explores the implementation of the teaching mode under the background of "industry-education integration" in CNC practical training classes. It proposes a unique concentric, consistent teaching mode, grasps its characteristics, and trains students in mechanical design and manufacturing major to become high-quality skilled talents needed by society.

**Keywords:** Industry-education integration, CNC practical training, Teaching reform.

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## 1. Background of Related Research

The integration of industry and education is a vocational college's approach to actively align professional industries based on the majors offered, closely integrate the industry and teaching, support each other, promote each other, and run the school into an industry-oriented operating entity that integrates talent training, scientific research, and technological services, forming a school and enterprise indistinguishable teaching mode. At present, China's higher vocational colleges still face many pain points in the practice of industry-education integration, such as loose pluralistic subject relations, unclear expected vision, and passive negativity of industry enterprises. On October 18, 2017, Comrade Xi Jinping pointed out in his report at the 19th National Congress that it is necessary to deepen the integration of industry and education.

At present, Rui 'an College has actively connected with leading industry enterprises to build characteristic industrial colleges, mixed-ownership practical training bases, carried out school-enterprise co-construction of majors, curriculum integration, textbook co-compilation, base sharing, and faculty co-appointment, and carried out in-depth cooperation in talent training, technological innovation, social services, employment and entrepreneurship, and cultural inheritance. Through the all-round integration of factors, the new connotation of school-enterprise cooperation is deepened. However, the author conducted research on the employment enterprises of graduates of the CNC practical training core course in the mechanical design and manufacturing major of Rui 'an College, and the feedback is mainly as follows. First, the disconnection between classroom professional knowledge and enterprise demand, when students enter the enterprise, they still need a period of longer training enterprise-related professional knowledge to adapt to the enterprise demand. Second, there is a bias in the positioning of students themselves in the CNC milling practical training course. Students in the school workshop practice think that they are presented as students, have lower requirements for themselves, and cannot achieve the perfection of

craftsmanship like enterprise employees in the product manufacturing process. Third, the teaching quality of CNC practical training courses in many higher vocational colleges is generally not high, especially the single evaluation mechanism during the training process, the comprehensive application ability of students cannot be reflected, and the teaching process cannot be taught according to their aptitude, resulting in the overall low teaching quality.

## 2. Alliance of Industry-Education Integration, Laying the Foundation for CNC Practical Training Teaching Reform

The introduction of corporate culture to campuses provides students with the opportunity to understand corporate culture and job requirements, enabling them to better understand the demands of the job market. It helps students identify their own shortcomings and actively work on improving and enhancing their professional qualities, laying a solid foundation for their future career development. This approach guides students to set education goals focused on employment, integrating vocational education with corporate management culture, promoting the integration of industrial culture into education, and bringing occupational culture into the classroom.

Schools should effectively leverage the educative function of campus culture, incorporating corporate culture, management methods, rules and regulations, and environmental protection concepts into the entire process of education and teaching. This enables students to gain an understanding of work processes, management systems, safety regulations, and foster good behavioral habits, enhancing their sense of identification with the industry.

Specifically, the following approaches can be taken to introduce corporate culture:

(1) Conduct corporate culture lectures and training: Invite corporate leaders, executives, and outstanding employees to campuses to deliver lectures and provide training to students, introducing them to the cultural concepts, values, and

management methods of enterprises. Through examples and case studies, students can gain a deeper understanding of the importance and role of corporate culture.

(2) Develop a campus corporate culture plan: Schools can create specific plans to integrate corporate culture into campus culture development. This includes organizing cultural promotion activities, creating slogans and mottos, and establishing school ethos and discipline systems that incorporate elements of corporate culture, forming a unique school culture.

(3) Organize corporate culture practical activities: Schools can arrange for students to visit and intern at corporate sites, allowing them to experience the work environment and corporate culture firsthand. Additionally, schools can organize events such as corporate culture exhibitions and competitions for students to participate in, enabling them to understand and experience corporate culture.

(4) Establish a corporate culture mentoring system: Schools can invite corporate elites as mentors to guide students in one-on-one or group interactions, sharing the concepts and practices of corporate culture. Mentors can regularly communicate with students to guide them in applying corporate culture thinking in campus and real-life situations, cultivating their professional qualities.

In addition, schools must incorporate elements of corporate culture into campus culture development, enriching and expanding the content of campus culture construction. This allows vocational colleges to reflect their vocational education characteristics through their campus culture, achieving the organic integration of school and corporate culture.

### **3. Integrating Industry and Education, Enhancing Student Vocational Competence**

In terms of cultivating talent, schools should actively connect with the regional industry chain and attract industry-leading enterprises to collaborate in establishing pre-employment classes and integrated classes. Together with the enterprises, they can guide students in the development of comprehensive competencies and create a recruitment-training-employment linkage mechanism. The cultivation of student competencies in cooperation with enterprises mainly consists of two aspects.

Firstly, students can participate in pre-employment internships with companies during winter and summer vacations. Pre-employment internships involve students choosing companies and positions according to their own preferences, and completing internships at selected companies and positions during winter and summer vacations. After graduation, they can directly enter the workforce without needing to go through interviews and probation periods. These internships guide students in transforming their role perception and are an important manifestation of the integration of industry and education and school-enterprise cooperation.

Regarding the reform of practical training education, the integration of industry and education and school-enterprise cooperation play a crucial role. Schools can establish close partnerships with enterprises, introducing the actual production environment of enterprises into practical training education and allowing students to practice in a real business environment. On one hand, this can enhance students'

practical and problem-solving abilities, improving their employability. On the other hand, students can experience the management concepts and regulations of the company during practical training, which can change their role perception and behavior norms. Through cooperation with enterprises, schools can update and optimize the content and methods of practical training education, making them more aligned with actual production demands. Schools can adjust and improve practical training courses according to the requirements of companies and the development trends of industries, guiding students to develop skills and competencies that meet market demands. Additionally, the integration of industry and education can also promote the professional development of teachers, increasing their work experience and practical experience, and improving their teaching ability and educational capacity. The integration of industry and education and school-enterprise cooperation have played a positive role in the reform of practical training education. Through cooperation with enterprises in conducting practical training and internships, students can experience real business environments and actual work demands, improving their professional ethics and employability. At the same time, schools can also utilize the resources and experience of enterprises to improve and enrich the content and methods of practical training education, cultivating talents that are more adaptable to market demands.

During the internship process in winter and summer vacations, an innovative ethical evaluation system can be constructed based on enterprise management concepts. Students can receive credits for ethics education, which are quantified and given corresponding levels of assessment. The quantifiable indicators include morality, intelligence, physical wellness, aesthetics, labor, and other aspects. The purpose of this evaluation system is to conduct targeted ideological and ethical education for students. Through learning, education correction, supervision training, assessment, and promotion at different levels, students' competencies are comprehensively improved.

Secondly, in the CNC training courses, students can be guided to change their role perception. They should realize that when entering the school training facility, they define themselves as employees of the company, rather than just students of the school. Their behavior norms are constrained by the regulations of the company and they should meet the requirements of the enterprise's 9S management model, striving for excellence and becoming skilled craftsmen of the new era.

### **4. Integrating Industry and Education, Establishing a Work-Study Integrated Teaching Model**

Taking the mechanical design and manufacturing major of Rui'an College as an example, a work-study integrated teaching model is established based on the product characteristics of packaging and printing machinery enterprises in Rui'an area, promoting the implementation of industry-education integration. First, the school and the enterprise sign an agreement on horizontal research projects of printing and packaging machinery product development, and determine the responsibilities and tasks of both parties through negotiation. Then, a modern CNC training base that meets the requirements of enterprises is built, and the teaching model dominated by enterprise production management and

guided by school teaching management is implemented. In practical training tasks, students complete production and training tasks under the guidance of practical training instructors and enterprise technical instructors, which improves the comprehensive professional capabilities and teamwork awareness of students.

The work-study integrated teaching model should be unique and standardized. Schools need to formulate relevant systems and procedures to regulate the cooperation between schools and enterprises, develop management methods and assessment details, and establish a school-enterprise mutual recognition assessment and evaluation management mechanism. Meanwhile, schools and enterprises need to jointly participate in the internship evaluation of students and establish a diversified evaluation system, including teacher evaluation, enterprise technical instructor evaluation, enterprise quality inspection evaluation, and enterprise comprehensive quality training evaluation. These evaluations can better measure students' professional skills and vocational qualities, providing reference for their employment.

To achieve a work-study integrated teaching model, "dual-teacher" educators are needed, who possess solid theoretical foundations and skilled operation capabilities. Schools may organize teachers to participate in national backbone teacher training, encourage them to participate in skills assessment and competitions, and enhance their practical capabilities and teaching levels. In addition, schools can also hire skilled workers from enterprises as teachers, so that their educators can learn new knowledge and skills. Performance appraisal systems should be established to select outstanding practical training instructors and masters, forming an incentive mechanism. At the same time, schools can also carry out two-way job rotations with enterprises to improve the practical abilities and teaching levels of their educators.

Through the above measures, the teaching model of "base is workshop, teacher is master, student is apprentice, and work is product" can be realized, promoting the development of industry-education integration.

## 5. Integrating Industry and Education, Development in Contradictions

Integrated development in industry-education is a model that emphasizes on the close cooperation and integration of the industry and education sectors. It combines the strengths of both sectors to integrate education with industry, achieve holistic talent development, and promote the seamless connection of talent and industrial development. However, there are certain challenges that need to be addressed for the success of this model.

(1) The mismatch between the demand and supply from academia, industry, and the government.

Universities and enterprises often differ in their goals and operating methods. Universities focus on education goals, including knowledge transfer and comprehensive student development, whereas enterprises aim at creating value and satisfying market needs. Hence, there may arise differences in time and rhythm, with enterprises expecting academic institutions to align their academic schedules with enterprise production cycles. On the other hand, university teaching management systems and curricula may not be well coordinated with those of enterprises. The government can intervene to coordinate, adjust, and promote collaborations between universities and enterprises.

(2) Issues related to teaching quality, faculty training, and assessment systems.

With integrated development in industry-education, a more appropriate and relevant curriculum needs to be designed. Currently, there is a lack of textbooks that align with the industry-education model, and hence relevant textbooks need to be devised based on the actual needs. Additionally, both universities and enterprises need to build a team of faculty, trainers, and internship instructors rigorously suited for an integrated education model with an emphasis on students' practical experience. Faculty training and capacity building need to be emphasized to enhance the competitiveness of academia. Furthermore, student assessment and evaluation in Internship modules need to be addressed, and a fair and scientific evaluation system needs to be developed to encourage innovation and enhancing problem-solving skills.

(3) The challenge of aligning institutional management systems and work mechanisms.

There may be differences in management systems and work mechanisms between universities and corporations, leading to conflicts and difficulties in collaboration. Universities prioritize institutional management and teaching norms, whereas corporations emphasize efficiency and productivity. To overcome these obstacles, a sustainable mechanism to reinforce long-term collaboration, communication, and mutual understanding is essential for developing academic-industrial partnerships.

(4) The gap between educational concepts and corporate requirements.

The difference between educational concepts and corporate demands could lead to irrelevant curricula and courses. Academic institutions need to improve collaboration with enterprises, explore their demands, and understand trends, therefore adjusting curricula to develop graduates' practical skills and innovative minds to meet market needs.

Industry-education integration is a complex and long-term undertaking that involves universities, enterprises, and the government working together to strengthen cooperation and promote mutual benefit. Through proactive problem-solving and the establishment of effective collaborative relationships and mechanisms, the objectives of industry-education integration can be realized, which would, in turn, provide firm support and development towards the society's economic sustainable development.

## 6. Conclusion

This research takes Rui'an College as an example to deeply explore the strategies and methods of CNC practical training teaching reform under the background of industry-education integration. Firstly, it provides an overview of the relevant research background, emphasizing the necessity and urgency of industry-education integration in response to the new situation of social development and industrial upgrading. Secondly, this study examines the influence of establishing industry-education integrated alliances on the practical training teaching reform of CNC, providing a strong foundation for teaching reform. Thirdly, it discusses the role of industry-education integration in strengthening students' professional quality training, highlighting the key position of professional quality in coping with future employment challenges. Fourthly, it investigates the application and significance of industry-education integration in establishing an integration of engineering and learning teaching model, providing useful insights for teaching innovation. Finally, this

study analyzes the contradictions and problems that exist in the process of industry-education integration and proposes corresponding solutions. Overall, this research provides theoretical references and practical guidance for CNC practical training teaching reform under the background of industry-education integration. It has great significance in improving education level and cultivating high-quality talents.

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