The Practice of "Eight Collaborations" for Industry-Education Integration in Cultivating Applied Talents

Li Du*, Siyi Ji

Chengdu Neusoft University, Chengdu, China

*Corresponding author: duli@nsu.edu.cn

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Abstract: Industry-education integration is a crucial measure for applied universities to address the issues of talent cultivation and social demand. However, due to differences in values, nature, functions, goals, and reactions to social changes between universities and enterprises, the integration remains superficial, resulting in a significant gap between the quality of applied talent training and social demand. With the aim of cultivating applied talents, this article focuses on the commonalities between "industry" and "education" by targeting the needs of the industry for talents and the process of professional talent training. It constructs an "eight collaborations" education model for industry-education integration in applied undergraduate universities, providing a valuable reference for applied universities to achieve industry-education integration.

1. Introduction

The transformation of local ordinary undergraduate universities towards applied education is not only a response to the demand for applied technical talents from the country and regions, but also an inevitable trend in the development of higher education. The goal of cultivating applied talents is to foster high-quality talents who can adapt to the needs of national economic development[1]. To achieve this goal, it is an inevitable trend for applied universities to cooperate deeply with enterprises and promote collaborative education with industry. The "Several Opinions on Deepening the Integration of Industry and Education" issued by the State Council in 2017 pointed out that deepening the integration of industry and education and promoting the organic linkage between the education chain, talent chain, industrial chain, and innovation chain is an urgent requirement for promoting the supply-side structural reform of human resources[2].

According to a report by the McKinsey Global Institute, there is a supply gap of 24 million skilled talents as of 2020. The difficulty of finding jobs for college students has become a common social phenomenon. A report by the McKinsey Global Institute in 2021 pointed out that the lack of qualified practical skills among Chinese college students will affect economic growth. The phenomenon of "difficulty in finding employment" for college students and a "labor shortage" in the corporate industry reveals that the disconnect between domestic universities and social needs is still severe. Thus, all the applied undergraduate universities may face some issues, such as why has the integration of industry and education encountered difficulties? How to effectively promote the integration of industry and education? [3]

2. The Dilemma and Understanding of Collaborative Education between Industry and Education in Applied Undergraduate Colleges

2.1 The issue of "insufficient driving force" for industry-education integration.

Although colleges and universities possess abundant human resources and innovative resources, and enterprises require corresponding human, intellectual, and technological support, the cultivation of applied talents is a complex engineering issue involving a large number of participants. The asynchronous operational management mechanisms between schools and enterprises make it difficult to form an effective mechanism of collaborative governance and evaluation feedback between them.

The lack of driving force for enterprises to promote collaborative education between industry and education results in many current school-enterprise collaborations being superficial.

2.2 The issue of "disconnects" in the path of industry-education integration[4].

Colleges and universities aim at talent cultivation, which is a long-term process, and it is difficult to achieve results in a short time[5].. Nevertheless, enterprises aim at profitability and emphasize immediate earning capacity, leading to asynchronous goals and orientations between colleges and enterprises. This creates disconnects in the cultivation path of collaborative education between industry and education, preventing synchronous development and concerted efforts.

2.3 The issue of "form outweighing substance" in industry-education integration.

The most fundamental elements of talent cultivation is courses setting. Currently, the course setup in colleges and universities forms an independent system that lags behind industry frontiers. College teachers are also unable to effectively bring the latest and most practical technologies and experiences from the industry into the classroom. Although many colleges and universities promote school-enterprise cooperation, they still cannot effectively address the issue of enterprises' actual integration into courses.

3. Exploration and Practice of Collaborative Education between Industry and Education Based on the Cultivation of Applied Talents

Chengdu Neusoft University, an undergraduate institution with the goal of cultivating applied talents, has seized the opportunity presented by the pilot project for overall transformation and development reform of undergraduate institutions to initiate a major discussion on educational and teaching ideologies, aiming to unite thoughts and forge consensus. The university has issued the "Chengdu Neusoft University Constitution" and the "Implementation Plan for the Overall Transformation and Reform of Applied Technical Universities", clarifying the educational philosophy of focusing on the three major directions of "integration of industry and education, innovation and entrepreneurship, and international cooperation". Simultaneously, taking the integration of industry and education and collaborative education as the starting point, the university has actively carried out the overall transformation pilot reform of applied technical universities. Through eight years of exploration and practice, an "eight collaborations" education model for the integration of industry and education in applied undergraduate institutions has been formed by establishing a "three-level collaborative education mechanism" and a "five-measure collaborative education pathway". This model involves collaboratively determine objectives, collaboratively develop training programs, collaboratively design courses, collaboratively design projects, collaboratively develop textbooks, collaboratively implement teaching, collaboratively guide practical training, and collaboratively promote employment (Figure 1).
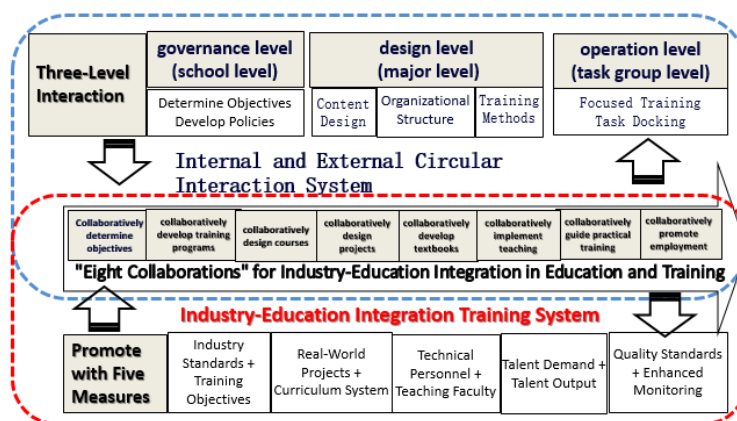

Fig. 1 "Eight Collaborations" Educational Model for Industry-Education Integration in Applied Undergraduate Universities

3.1 Establishment of a Three-level Collaborative Education Mechanism

The university has established a three-tiered progressive organizational structure for collaborative education between industry and education, consisting of governance, design, and operation levels. This structure incorporates industrial associations, industry leaders, and enterprise managers to form a mechanism for gradual alignment and implementation of education (Figure 2). By formulating documents such as the "Management Measures for Talent Cultivation Programs," the university has further improved its management mechanisms, fully leveraging and mobilizing the initiative and enthusiasm of all parties involved in collaborative education. This effectively integrates industry-education integration management into the daily teaching operations of the university, which achieving "substantiation, normalization, and standardization" of industry-education integration.
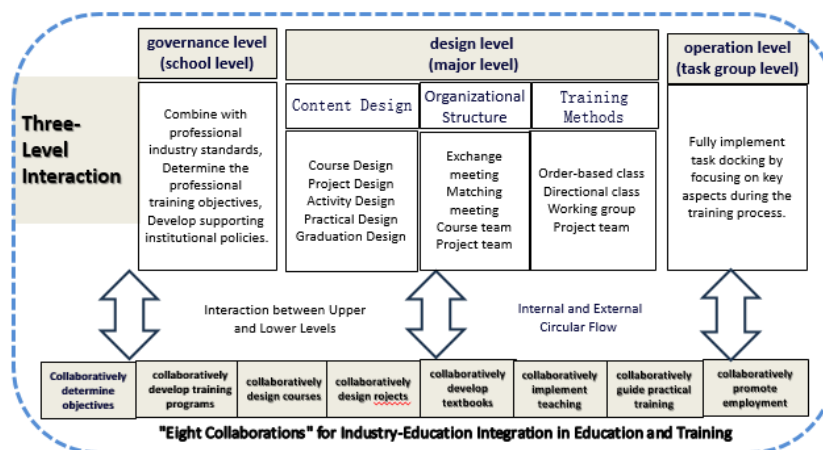

Fig.2 Three-level Collaborative Education Mechanism for Industry-Education Integration

3.2 Focusing on the Interface between Industry and Education to Advance a Four-Stage Collaborative Education Pathway

Targeting the demand for industrial talents and the process of cultivating professional talents, the university focuses on the four interfaces between "industry" and "education": industry standards and training standards, real-world projects and curriculum development, technical personnel and teaching faculty, and talent demand and talent output. By adopting a four-stage integrated approach (Figure 3), the university has realized the "eight collaborations" educational model for industry-education integration in applied undergraduate institutions, with the objectives of collaborative goal setting, collaborative revision of talent cultivation plans, collaborative curriculum design, collaborative project design, collaborative textbook development, collaborative teaching implementation, collaborative practical training guidance, and collaborative promotion of student employment.
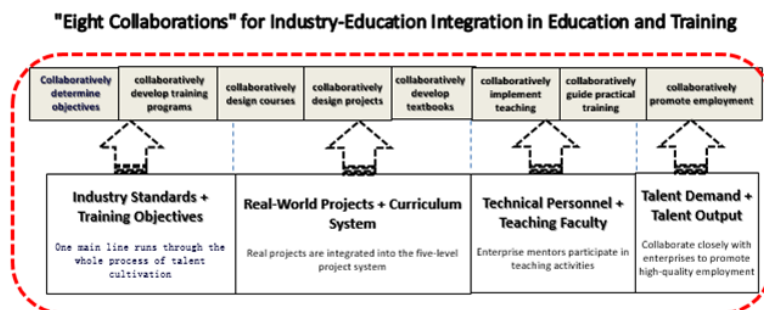

Fig. 3 Four-stage Collaborative Education Path for Integration of Industry and Education

1) "Industry Standards + Training Objectives": Integrating Industry Standards into Training Objectives to Construct the TOPCARES Capability Indicator System

Actively aligning with industrial needs, the university decomposes industrial concepts, standards, and training specifications into three major indicators: knowledge, ability, and literacy. By integrating and systematizing these indicators, the university has formed the TOPCARES Talent Cultivation

Capability Indicator System (Table 1.). The university has also introduced the "Ten-Step Method for Revising and Formulating Talent Cultivation Plans", incorporating industrial research into the revision of talent cultivation plans, requiring the integration of industrial concepts and standards into capability indicators. This effectively addresses the disconnect between talent cultivation specifications and social and industry needs, as well as the lack of alignment with industrial and innovation chains.

Table 1. TOPCARES Capability Indicator

Abbreviation	TOPCARES（Level 1 Capability Indicator）
T	Technical knowledge and reasoning
O	Open thinking and innovation
P	Personal and professionals kills
C	Communication and teamwork
A	Attitude and manner
R	Responsibility
E	Ethical values
S	Social value created by application practice

2) "Real-World Projects + Curriculum System": Integrating Real-World Projects into Course Content to Construct an Ability-Oriented Integrated Curriculum System

Using real-world projects as the logical mainstay, the university collaborates with industries and enterprises to analyze the knowledge system and technological logic system. Based on the technologies and processes of production, operation, and service, the university redesigns the structure, content, and order of the curriculum system for each major, establishing an ability-oriented, "five-level project"-driven, and dynamically updated integrated curriculum system. The university implements a "1321" semester system, where one academic year is divided into three semesters: two theory semesters based on cases and projects, and one practice semester for concentrated ability training. A five-level project system is constructed, which aligns with the four practical stages of "cognition-training-integration-innovation". This system integrates course teaching, comprehensive practical training, and graduation internship, and designs them as an integrated whole. Projects are implemented throughout the four years of students, enabling them to gradually improve their practical abilities.

3) "Technical Personnel + Teaching Faculty": Optimizing the Teaching Faculty and Establishing an Interactive Mechanism between School and Enterprise Teachers

The university has implemented an interactive mechanism between school and enterprise teachers to build a dual-qualified teaching faculty. It has issued management regulations such as the "Part-time Teacher Management Measures," "Graduation Design (Thesis) Work Regulations," and "Qualification Certification Measures for Dual-Qualified Teachers" to facilitate the recruitment of enterprise personnel as teaching and practical guidance teachers for various majors. The university actively recruits teachers with industrial backgrounds, assigns outstanding teachers to enterprises for on-the-job training, and involves them in project development work, promoting teachers' understanding of the "five new elements" in industrial technology and guiding them to integrate these elements into teaching.

4) "Talent Demand + Talent Output", Deeply Introducing Enterprises into Education and Establishing an Industry-Education Collaborative Training Platform

The school actively leverages its comprehensive advantages in talent and specialties, integrates resources from both industry and education, and builds an industry-education collaborative training platform, which centered on industrial demand. What's more, it actively promotes the joint construction and management of industry and education, explores the construction of industrial colleges, and ensures that talent output closely matches the talent needs of the industry. Focusing on the IT industry chain and regional industrial clusters, the school has forged close cooperation with leading enterprises such as Neusoft Group and Its Cartoon, and has established three school-level industrial colleges including "computer science, digital arts, and information management and service". By integrating the needs of teaching and industry, the school fully implements the "eight

collaborations" for industry-education collaborative training through measures such as joint planning of programs, dual construction of courses, dual selection of students and enterprises, dual guidance of the process, joint construction of resources, and dual evaluation of quality.

3.3 Dual Paths and Four-Party-Driven Collaborative Training Guarantee

Drawing on quality management concepts and methods such as ABET and PDCA, the school has initially established a quality assurance system for collaborative training driven by four parties: industry, enterprises, schools, and society, emphasizing both quality standards and monitoring. This system achieves dual-cycle quality monitoring both inside and outside the school, ensuring the quality of teaching in industry-education integration. Internal monitoring focuses on the TOPCARERS ability indicator system, which integrates industry standards and training objectives, and establishes quality standards for major teaching steps such as majors, courses, and projects. By incorporating industry and enterprises into the quality monitoring system, external monitoring is achieved through activities such as feedback on training quality, graduate surveys, and employer surveys. This ensures closed-loop management of "eight collaborations" in talent cultivation from the source to the terminal, guaranteeing the effectiveness of industry-education collaborative training.

4. Practice and Achievements

4.1 Deepening the Integration of Industry and Education through Collaboration with Industrial Enterprises

The school has established deep integration and cooperation with hundreds of enterprises in the industry. Together with companies such as Neusoft, ARM, SONY, INFOR, Lifang International, Qikartoon, and other universities, the school has established three school-level industrial colleges. In 2020, the school was awarded the title of the first batch of characteristic and exemplary software colleges in Sichuan Province based on its expertise in the field of industry application software. Twelve experimental and training rooms have been jointly established with enterprises, and the RuiDing practical teaching platform has been jointly built with Neusoft Ruidao, which includes eight professional directions, with each direction containing at least 20,000 lines of code for practical project resources.

4.2 Gradual Improvement in the School's Ability to Serve the Regional Economy

In the past two years, the school has actively participated in the Chengdu Municipal Committee of the CPPCC's online political consultation projects, introduced experts to hold new economic lectures for the four major leading groups in Dujiangyan City, and assisted the Dujiangyan Municipal Government in organizing the "Silicon Valley · Dujiangyan First Sichuan Business New Economic Development Forum and 2019 Chengdu Silicon Valley Community Economy Special Seminar". The school has undertaken the development and maintenance of systems such as "Art Quality Assessment," "Art Quality Report," and "Football Management System" used by over 10 million primary and secondary school students in Sichuan Province.

4.3 Improvement in Students' Practical Abilities and Competitiveness

Students' practical abilities have been continuously improving, and they have performed outstandingly in various academic and innovation and entrepreneurship competitions. In the past three years, students have participated in 424 provincial and above-level undergraduate innovation and entrepreneurship training projects, including 130 national-level projects. Additionally, 3,592 students have received provincial and above-level awards in various academic and innovation and entrepreneurship competitions in the past three years, with 1,098 of them receiving national-level awards. The professional alignment rate for graduates in the past three years has exceeded 85%.

5. Conclusion

The integration of industry and education is currently the goal of applied university reform in

China and an important means to address the disconnect between the cultivation of applied talents and the industry. Exploring how to promote deep integration between schools and enterprises in applied universities and effectively implement collaborative education between industry and education is a direction for further exploration in applied universities. Taking Chengdu Neusoft University as an example, this article provides measures and experiences on effectively addressing the issue of collaborative education between industry and education, providing a reference for other applied universities. In the future, the university will continue to explore the mechanism of collaborative education between industry and education, carry out the construction of industrial colleges, and explore the continuous promotion of the "eight collaborations" for collaborative education reform between industry and education, relying on the construction of industrial colleges. This will effectively promote the organic integration of talent chains and innovation chains between universities and enterprises.

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