

Comprehensive Talent Training and Application with Engineering Costing Specialization as a Pilot Program under the Deep Integration of Industry and Education

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Abstract: The deep integration of industry and education enterprise teaching is a new talent cultivation mode in colleges and universities, which can really implement and improve the hands-on practical ability of students, and can promote the high-quality development of engineering costing professional teaching. After exploration, the deep integration of industry and education is a new way of cultivating talents that integrates scientific research and scientific and technological services[1]. The deep integration of schools and enterprises is a win-win cooperation relationship, through strengthening the publicity and education of the comprehensive education concept of "post course, race and certificate", precise classification of students and differentiated teaching, strengthening the adaptability of the integrated curriculum, comprehensive optimization of the curriculum supply and integration of professional (group) curriculum resources, in-depth integration of industry and education[2], and promoting the innovation of the integrated curriculum mode to solve the problems of unscientific training orientation, poor students' ability to apply the software, professional ability training, and insufficient knowledge of positions and functions.

Keywords: talent cultivation; industry-teaching integration; engineering costing; teaching reform

1. Introduction

In recent years, due to the domestic engineering costing professional employment demand increases year by year, from the point of view of China's construction engineering research talent development needs and professional setup, engineering costing is a professional knowledge and practical skills require a high degree of comprehensive professional, and the current engineering costing professional learning content and students' practical experience has produced a large contradiction and gap, so that the final teaching effect of the professional students is not obvious, students' practical ability is not prominent enough, students mastered the relevant theoretical knowledge and practical ability with the current construction industry, there is a large gap between the front-line positions in the engineering costing professional demand for talent. The students' practical ability is not outstanding enough, and there is a big gap between the relevant theoretical knowledge and practical ability of the students and the demand for engineering costing professionals in the front-line positions of the construction

industry. Analyze the current college engineering costing professional education practice process can be found, engineering costing professional personnel training mode [3] there are some immediate problems to be solved, through the December 2022 issued "on deepening the reform of the construction of the modern vocational education system", issued in June 2023, "vocational education industry-teaching fusion empowerment and enhancement of the implementation of the action (2023-2025)", "2023-2025", "vocational education industry-teaching fusion empowerment and enhancement of the action (2023-2025)". The Opinions on Deepening the Reform of Modern Vocational Education System Construction issued in December 2022, the Implementation Plan of Vocational Education Industry-Education Integration Empowerment and Enhancement Action (2023-2025) issued in June 2023, and the Circular on Accelerating the Reform of Modern Vocational Education System Construction and Priority Tasks issued in July 2023, all of these policy documents can be found to elaborate on the integration of education and industry as the main content and effectively promote the rapid development of vocational education industry-teaching integration.

2. Background of implementation.

In 2017, the Government Office of the State Council issued the "Several Recommendations of the Government Office of the State Council on Promoting the Close Integration of Industry and Education", which vigorously promotes the reform of "attracting enterprises into education", encourages and guides enterprises to take the initiative to participate in the education and management of vocational colleges and universities, and to invest in a variety of forms, such as formulating professional specifications, writing textbooks, perfecting teaching content, adjusting the curricular arrangement, and providing opportunities for practice, in order to meet the requirements of enterprises and to apply them to the employment of graduates. meet the requirements of enterprises and apply them to the employment of graduates. In 2020, the "Recommendations of the Ministry of Public Security of the State Council on Promoting the Development of New Vocational Schools and Higher Education in the Construction of "Scientific and Technological Gansu Province"" proposed that school-enterprise cooperation should be actively promoted, and that close integration of production and education should be implemented in depth to promote the effective integration of various types of resources, and to facilitate the synergistic cooperation among enterprises, universities and all sectors of the society, so as to realize the effective operation of vocational training. Effective operation. In order to meet the needs of the growing industrial economy, all kinds of higher education institutions are encouraged to cooperate with the world's top enterprises, promote the advanced apprenticeship system, and construct an education development model that integrates the five domains[4], namely, trades, enterprises, industries, occupations and professions. Students will be given employment opportunities in their studies and be able to gain a foothold in the workplace, truly realizing that they can enter the workforce upon enrolment and be employed upon graduation.

3. Implementation highlights and innovations.

3.1 "Post-course integration" teaching, deepening the integration of industry and education and enhancing school-enterprise cooperation.

School-enterprise cooperation is aimed at creating a high-level innovative teaching and practice base for industry-teaching integration[5] as well as industrial colleges. Through the joint formulation and implementation of talent training programs, we have broken through the limitations of the traditional curriculum system, reset the structure of teaching content, improved the quality of teaching by oriented teaching, and truly realized the integration of the curriculum system and curriculum with the typical tasks of the actual positions in enterprises. We follow the principle of "complementary needs, shared advantages, shared resources, win-win cooperation, synergistic development", and adopt a variety of forms and links of multi-level personnel training mode, in-depth cooperation in the cultivation of talents, development of curricula, the construction of bases and employment internships, based on the school-enterprise dual-unit "modular" talent cultivation innovation model[6], realizing a seamless connection between the school and the enterprise cultivation of human beings.

Relying on the Employment Parenting Program, the College's engineering costing program has signed an agreement on supply and demand docking employment parenting program with enterprises, implemented targeted talent training, built employment internship bases, improved the level of "learning and training integration" teaching, and promoted the effective docking of supply and demand of talents, not only cultivating composite talents for the enterprises, but also delivering practical talents for the head enterprises that are in close cooperation with each other. The construction content includes.

- (1) Establishment of one speciality class;
- (2) Developing two courses co-constructed by schools and enterprises;
- (3) Constructing high-quality engineering construction training resources;
- (4) Implementing the regulations for teachers to practice in enterprises on a regular basis.
- (5) Establishing one career mentor programme[7];
- (6) Strengthen the depth of employment cooperation and improve the employment quality of graduates.

3.2 The teaching of "integration of lessons and competitions" helps students to enhance their professional knowledge and strengthen their comprehensive vocational quality.

Relying on the competition to promote teaching reform and professional construction, combining the practical teaching content of the competition with the training methods, combining the evaluation standard system of the competition with the evaluation standard of teaching engineering, and making professionalism throughout the training process of the competition. In this way, we can realize the construction of "three-in-one" practical teaching system, i.e. "single skill training + comprehensive skill training + innovation ability training".

3.3 The teaching of "integration of courses and certificates" focuses on students' personalized growth and employment quality.

(1) Integration of vocational skill level standards and teaching standards of professional courses[8]. Explore the common points and potential relationship between vocational skill level standards and professional course teaching, optimize the teaching standards of professional courses, decompose the vocational skill level standards, and then integrate them in batches by academic year and semester, so as to make the teaching progress seamless.

(2) Integration of vocational skills training module and professional course structure system. Relying on the modularized curriculum reform system, and with the goal of fully meeting the reinforcement of practical teaching, we will transfer class hours and strengthen vocational skills training as much as possible.

(3) Integration of vocational skills training content with the content of specialized courses. Improve students' professionalism, expand students' professional knowledge, organize the new standards, norms, technologies and techniques encountered in vocational skills training, assemble them into a resource library and put them into daily teaching activities, so as to realize the seamless connection between teaching and information of the front line of enterprises.

4. Reform ideas and design

4.1 The college has intensified its efforts to promote and educate on the "post-course competition certificate" concept to ensure its policies and measures are firmly established in the public consciousness. This aim will be supported by a comprehensive strategy for education and publicity.

(1) Clarify the design intentions behind the comprehensive education system that includes post-course competitions and certifications, as well as the primary purpose of student participation in these events. This will help ensure that students are motivated correctly and can make informed decisions regarding how they participate, thereby changing their mindset and enhancing their autonomy in learning, participation, and certification. It will also encourage them to abandon the shallow pursuit of competition rankings and exam certificates;

(2) To enhance vocational awareness and job quality, and cultivate students' vocational planning ability, it is important to provide a clear understanding of the 1+X certificate system[9] and the corresponding mechanism of industry competition, allowing students to grasp the relevant aspects of modern vocational education in China across multiple directions and fields..

(3) Choose classroom teaching as the primary method for promoting, and use a range of forms and channels to implement it, including new student induction training, vocational ethical training, and community activity participation. This ensures a harmonious integration with the campus cultural brand construction and curriculum renovation.

4.2 Paying deep attention to students' differences and improving the adaptability of the integrated curriculum

Through careful research, students are finely grouped, with interest, specialties and needs as important considerations, and appropriate guidance is given. Based on sufficient research and career planning guidance, personalized training programs are provided for different classifications. According to the different characteristics of each trainee, an effective and diversified education model is adopted to meet their actual needs, enhance the overall level of the professional curriculum and achieve comprehensive development. Fine management of the curriculum system, internal and external linkage. For the professional aspects of the "competition" and "certificate" to establish a selection system and formulate the assessment system.

4.3 Comprehensively adjust the curriculum system, optimize the professional (group) curriculum resources

(1) Integrate the standard system of professional courses. When formulating and revising each professional talent training program, we should carry out research on the typical work tasks of diversified positions, and refer to the latest national standards and rules, such as vocational education standards, line enterprise standards and competition standards. Through the construction of the curriculum system and the reformulation of the curriculum standard, optimize the design of classroom teaching content to ensure the basicity and threshold of the curriculum, and at the same time, ensure the consistency and homogeneity of the curriculum.

(2) Organize and optimize the curriculum resources of professional groups. In order to better meet the manpower needs of different industries and enterprises, the principle of "sharing at the bottom, separating at the middle, and selecting each other at the top" is considered to be the best guiding principle. Therefore, in order to achieve this goal, it is necessary to effectively integrate the curriculum resources of each professional group and redesign the structure system of the courses according to the correlation between them, so as to stimulate students' enthusiasm for learning and acquire more knowledge reserves.

(3) Based on the development of students' vocational core qualities and the overall arrangement of the national "competition" and "certification", we should comprehensively promote the integration of "post-course, competition and certification", reasonably plan the work objectives and formulate the preparation program for the competition.

4.4 Reasonably promote the integration of industry and education, and deeply promote the innovation of the integrated course mode.

Through redesigning, improving, adjusting and innovating, we strive to overcome the pain points and difficulties in the current curriculum reform, continuously improve the talent training program, enhance the level of discipline construction, strengthen the cooperation between schools and enterprises, promote the integration of production, learning and research, and realize the win-win situation of schools and enterprises.

(1) In order to truly implement the State Council's decision-making deployment of "stabilizing employment", "preserving employment" and "promoting employment", the college vigorously develops school-enterprise cooperation, strengthens talent cultivation, and promotes

collaboration between enterprises and colleges and universities, and takes engineering costing as a pilot to start the project with the name of the "2021 Supply and Demand Docking Employment Nurturing Project Declaration Guideline Matrix". management and service industries, to promote the organic linkage between teaching and employment, and to solve the problem of talent supply and demand.

(2) In order to promote school-enterprise cooperation and exchanges, the college and the high-quality enterprises recommended by the Cost Association have established a "teacher practice and training base"[10] to reform the construction of the college's teaching team in depth, cultivate a "dual-teacher" teaching team with strong comprehensive qualities, and serve the needs of the college's "double-high" construction. It also promotes teachers to practice in enterprises on a regular basis, constantly improves their practical teaching ability and scientific and technological service innovation ability, and provides a strong teacher base for cultivating and exporting complex technical and skill talents.

5.Problems and solutions

5.1 Unscientific cultivation orientation

Engineering costing is a cross-professional discipline combining engineering technology, economics and management. This specialized course not only requires students to master the knowledge of engineering related technology, but also needs to be able to reasonably combine the knowledge of economic management. However, at present, many courses are still using a single teaching mode, the courses can not be well connected, engineering technology and economic management can not be effectively combined, so that the training of engineering costing talents can not meet the demand for comprehensive and technical talents. The industry, enterprises and colleges and universities can link up, form analysis reports through research, jointly formulate and revise talent training programs, and realize the quality docking of teaching and employment.

5.2 Poor students' software application ability

At this stage, some schools due to funding problems lead to the purchase of relevant software can not meet the needs of students' practical training, resulting in software application courses can not be a good opening, in the teaching session for students to learn software training coverage and familiarity is not enough. At present, the most commonly used costing software on the market are Luban, Quanta, Pinming, etc., but their functions in actual operation are different, and students can only meet one of the software for learning. Through the school-enterprise joint construction of shared training room, enterprise instructors into the classroom, full-time teachers into the front line, to understand the industry development and job competence requirements, reconfigure the curriculum system and adjust the content of the lectures, to typical work task research as the starting point for sorting out the elements of knowledge and skills, so as to build new and expand the resources of practical training.

5.3 Cultivation of professional ability needs to be strengthened

At present, the background of engineering costing schooling still follows the traditional mode of schooling, so the professional curriculum is also extremely unreasonable, and even the

traditional practice and theory of the course structure. The irrational curriculum will directly affect the students' understanding of professional knowledge, and the engineering costing students can not meet the job requirements when they enter the society. Therefore, school-enterprise co-construction, research and teaching can solve the problem of funds and the problem of teachers' professional ability.

5.4 The effect of practical training is not good, and the position and function cognition is insufficient.

Currently in the engineering costing professional practice training links, many schools are not set up scientifically and reasonably. Engineering costing students to carry out the practice of content and means in the future of the actual work can not be effectively applied, the practical activities carried out by the school and the actual demand for work is far from. To provide students with the opportunity to study in the enterprise vacation internship, and with industry experts to guide the lecturers, to achieve the "experts + teachers" dual education, so that the student learning content is really in line with the needs of the industry front-line, the implementation of the graduation that is to be on the job.

6. Conclusions

Based on the integration of industry and education and the innovation of talent cultivation mode in engineering costing specialty, we have established close partnerships with enterprises. We implement directional talent cultivation, establish employment internship bases, and enhance the "learning and training integration" teaching level. This promotes an effective alignment between the supply and demand of talents. Our efforts enable enterprises to cultivate composite talents while also delivering practical talents. We achieve these goals by using clear, concise, and logical language, avoiding subjective evaluations, following conventional academic structure and formatting, and maintaining a balanced, objective tone. We also use correct grammar, precise vocabulary, and consistent citation and footnote styles. Through effective communication and collaboration between educational institutions and businesses, teaching methodologies have evolved. The practice of integrating theory and practical application has been widely embraced, culminating in the development of a first-rate faculty of dual teachers. These teachers possess exceptional skills in scientific and technological innovation, providing unparalleled support for the production of highly skilled professionals. The findings reveal that the integration of industry and education is pivotal in the transformation of the professional talent training approach in universities and colleges. Accordingly, the institutions can collaborate with apt enterprises based on their specific circumstances, and establish an integrated industrial ecological chain. This measure paves the way for the advancement of industry and education by cultivating the requisite skills in students and preparing them for the job market.

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