Analysis on the Theory and Practice of Higher Vocational Course Evaluation under the Background of Industry-education Integration—Based on Literature Research and In-depth Interviews

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[**Abstract**] The integration of industry and education is essential for the development of vocational education in China. However, this integration has not yet been fully realized, and research on how enterprises can participate in course evaluation remains in its exploratory phase. Through literature analyses and in-depth interviews, this paper examines the current state of course evaluation in higher vocational education from both theoretical and practical perspectives. It is found that there are several issues such as misaligned evaluation goals between schools and enterprises, unreasonable and incomplete evaluation content settings, and obstacles in the implementation of evaluations. Suggestions are proposed to address these issues, including strengthen school-enterprise cooperation, refine the evaluation indicator system, and establish a dynamic adjustment mechanism for evaluation implementation. These recommendations aim to provide reference for promoting the transformation and development of higher vocational education evaluation.

[**Key words**] industry-education integration; curriculum evaluation; higher vocational education; evaluation optimization; technical personnel training

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1 Introduction

The cultivation of higher vocational talents in China focuses on enhancing vocational skills, characterized by technical and professional features. To achieve this goal, an effective approach is to deepen the cooperation between schools and enterprises to form a dual-subject education model. In December 2017, the General Office of the State Council issued the first specialized document on the integration of industry and education: *Several Opinions on Deepening Industry-education Integration*, elevating "industry-education integration" to a strategic measure for national educational reform. From the perspective of policy implications and the trend of transformation in the education industry, industry-education integration has become the inevitable path for the high-quality development of higher vocational education. In the process of talent cultivation, evaluation is not only a critical component but also a direct reflection of the outcomes of training and plays a guiding role in identifying key points. This highlights the significant position of evaluation. Under the background of industry-education integration, the methods, forms, and implementation of talent cultivation evaluation have become more complex. Course evaluation is the core component of it and the key to solve the evaluation problem. This paper takes the literature data and interview

records as the research samples, and analyzes them from the theoretical and practical levels. The research results will provide decision support for the evaluation of higher vocational courses, and further deepen the reform of the vocational education evaluation mechanism.

2 Review of literature studies

The research team reviewed nearly a decade of literature on the course evaluation of industry-education integration, selecting high-quality articles from core journals and renowned scholars for analysis. Current research on this topic primarily focuses on two aspects: industry-education integration, and curriculum or talent cultivation. The former explores the essence and models of industry-education integration, with evaluation serving as a component of the overall design. The latter focuses on the course itself or the result of talent training. When constructing the evaluation system and designing the evaluation indicators, it reflects the dual subject status of schools and enterprises, which is a practice of applying the concept of industry-education integration to the course evaluation.

2.1 Research on the perspective of industry-education integration

In 2013, the term "industry-education integration" first appeared in official documents. *The Decision of the Central Committee of the Communist Party of China on Several Major Issues Concerning Comprehensively Deepening Reform* proposed to accelerate the construction of a modern vocational education system, deepen the integration of industry and education, and strengthen the cooperation between schools and enterprises, to cultivate high-quality workers and skilled talents. Since then, many scholars have discussed the concept of "industry-education integration". Wang Jiyuan (2017) defines it as a development strategy where universities and industries closely collaborate, complement each other, support each other, and promote each other in talent cultivation, technology development, and the transformation of research results. Compared to earlier terms like "school-enterprise cooperation", "industry-academia cooperation", and "combination of work and study", the term "industry-education integration" is more comprehensive and reflective of contemporary characteristics. As Wang Danzhong (2014) noted, integrated development is one of the key features of scientific development, where the relationship between entities becomes closer, reflecting the inevitable logic of the integration and mutual causality between industry and education in the process of industrial upgrading and the connotative development of higher vocational education.

While exploring the essence of industry-education integration, how to construct corresponding courses and training models is also a key focus for researchers. Research in this area primarily focuses on two areas: theoretical analysis and school-running experience empirical studies. In terms of theoretical analysis, Zhu Aiqing (2019) offers a typical perspective. She views schools and enterprises as two distinct entities with different roles, aiming to integrate resources effectively to create a new model of vocational education that combines a comprehensive curriculum system, an excellent faculty team, and a scientific support system. In empirical research, scholars often use specific practices from a particular school or major to explore how to establish an effective operational framework for industry-education integration, thereby developing unique training models. Common practical approaches include developing school-enterprise cooperative project courses, promoting cooperation mechanisms through projects and platforms, co-establishing industry colleges with mixed ownership by enterprises and schools, and building new types of factories within schools. In these models, evaluations are primarily based on the effectiveness of project course learning, the pass rate of professional skills assessments, and the completion of tasks assigned by enterprises.

2.2 Research on the perspective of curriculum or talent cultivation

Theoretical research focuses on the essence, functions, and theoretical foundations of course evaluation. For instance, Xiao Fengxiang and Ma Liangjun (2013) formulated the basic principles of curriculum evaluation in China's higher vocational colleges based on the goal orientation of "technical rationality", the process orientation of "practical rationality" and the subject orientation of "liberating rationality". Lei Hao (2020) expounded the

theoretical basis, connotation and research methods of curriculum evaluation in the era of core literacy, and proposed the curriculum evaluation method of core literacy based on relativism, social constructivism and participation theory.

Applied research primarily focuses on specialized studies of evaluation indicators. Scholars such as Li Daozhi et al. (2010), Wang Lu et al. (2013), Chen Zhiqiu and Ma Wuming (2014) have studied the evaluation indicator systems from various perspectives, including the applied talent training combining work and study, the development of innovative and entrepreneurial talents, and third-party evaluations. Additionally, some studies focus on exploring the overall mechanisms and models of evaluation, which mainly center on setting evaluation goals, selecting evaluation subjects, ensuring the rationality of evaluation content, and diversifying evaluation methods. Representative studies include Bao Xingxian (2015) used the Analytic Hierarchy Process (AHP) to construct an evaluation index system for the quality of skilled talent cultivation under the school-enterprise cooperation framework and carried out the example verification. Wu Qiuchen and Xu Guoqing (2023) believe that the establishment of a talent training evaluation system in higher vocational colleges needs to follow the law of industry-education integration, and they have conducted an in-depth discussion on four key issues, including formulation principles, value goals, evaluation modes and objective laws.

2.3 Analysis of the research status

From the current literature, discussions on the connotations and methods of integrating industry and education are predominant. These discussions often evaluate existing teaching models and offer suggestions for deepening the integration between schools and enterprises. However, there is still a long way to go from theoretical research to practical implementation. While some successful experiences and models are worth learning from, the significant differences in resources and environments among universities make simple replication impractical. When it comes to course evaluation, researchers have different focuses, some emphasize assessing students learning quality, some focus on evaluating students' overall qualities, others aim to enhance the quality of the training subjects. Notably, while the role of enterprises is recognized in most studies on course and talent cultivation evaluation, issues such as low levels of integration between schools and enterprises, unclear division of labor, unreasonable and incomplete indicator settings, and the special nature of cases that are difficult to generalize remain prevalent.

In general, the core of various studies focuses on student development, aiming to promote the deep integration of industry and education, and to cultivate high-quality skilled talents that align with technological advancements and industrial upgrades. The evaluation of higher vocational courses in the context of industry-education integration is an important topic. At present, there are some theoretical and case studies worth referencing, but the number of high-level articles is limited, and relevant research still needs to be further deepened and enriched.

3 In-depth interview analysis

3.1 Interview design

Most of the research on literature materials is theoretical. To ensure the completeness of our study, our team conducted in-depth interviews to analyze the evaluation issues of industry-education integration courses from a more practical perspective. The interviewees include teachers and teaching management personnel of higher vocational colleges who have participated in the formulation of curriculum standards and have rich teaching experience, as well as enterprise mentors who jointly carry out talent training with the college. There were five people in each category. The interviews were conducted in a semi-structured format, we designed open-ended questions, and followed up with probing questions based on the respondents answers to achieve in-depth discussions. The questions primarily covered evaluation object, evaluation subject, evaluation content and standard, and evaluation method.

3.2 Analysis of interview results

The research team discussed the key questions of the questionnaire with the respondents, and after sorting out and summarizing, the key points of interview results are summarized as follows:

First of all, the evaluation objectives. Vocational colleges focus on employment-oriented talent development, aiming to cultivate skilled professionals that meet the needs of enterprises. Therefore, key indicators for course evaluation include students' professional skill level, work task completion, and job competency alignment. Additionally, the cultivation of students' comprehensive qualities is equally important, including professional ethics, teamwork, communication, innovation, and the ability to learn new knowledge and technologies. This ensures they can better adapt to industry trends and meet enterprise demands, while also promoting personal all-round development.

Second, the evaluators, or the implementing party of the evaluation. In the context of industry-education integration, the primary evaluators are school teachers and enterprise personnel, with different roles and varying evaluation weights. School evaluations focus on theory and process, while enterprise evaluations emphasize practical operations and project outcomes. There are differences in opinions among different respondents regarding which party should be the main evaluator, mainly due to the differences in their identities, majors, and the nature of the courses they teach. However, they generally agree that enterprise participation in evaluations is essential. Enterprise mentors or employers can provide feedback that is more in line with the actual needs of the workplace, and their evaluations of students' practical abilities, work attitudes, teamwork are of significant reference value.

Third, the evaluation content and standards. The evaluation content is guided by the evaluation objectives, which are refined to facilitate implementation. Generally, the evaluation content can be categorized into professional knowledge and skills, as well as professional qualities and comprehensive abilities. Professional knowledge and skills encompass theoretical knowledge and practical application skills, such as operating instruments, completing projects, and designing project plans. Professional qualities and comprehensive abilities cover a wide range of areas, including professional ethics, professional attitude, teamwork and communication, innovation and learning abilities, and so on. For courses cooperatively conducted by schools and enterprises, it is also necessary to assess the quality of students' project outcomes, such as whether they match the actual needs of enterprises, comply with industry standards, adapt to market changes, and provide value to enterprises.

Fourth, the evaluation methods and technologies. Most respondents adopt an evaluation method that combines formative and summative assessments. Formative evaluations focus on students' performance during the learning process, such as classroom participation, homework completion, and group discussion performance. Summative evaluations, on the other hand, provide a comprehensive assessment of students' learning outcomes through methods like final exams, project presentations, and works exhibitions. With the advancement of the smart campus project, the implementation technologies of evaluation have also shown a trend of technological advancement. Some handwritten records are replaced by various methods, including activity records from online classes, automatic scoring on simulation training platforms, and AI scoring based on the completion of core project indicators.

Fifth, the main issues and contradictions. Interviews revealed that while school-enterprise cooperation has deepened and course evaluations have improved, it still cannot well match the job requirements and there is a gap between the goal of cultivating excellent vocational ability. The primary issue is the disconnection between school evaluations and enterprise needs. For example, high-scoring students may not be recognized by enterprises due to inefficient adaptability, while those who perform averagely but are skilled in practical tasks are more favored by companies. Another major problem is the poor effectiveness of comprehensive quality evaluations. Moral and ideological education evaluations often remain superficial, failing to delve into behavioral details, which results in many students' psychological quality, adaptability to new environments, stress management, and teamwork skills being exposed as inadequate in a corporate setting. Finally, due to differing interests between schools and enterprises, there exists conflicts in evaluation orientation. Schools have their own talent training indicators to complete, while enterprises need to solve the "cost-benefit" problem, which affects the evaluation standards of both sides.

4 Optimization strategies of curriculum evaluation under the background of industry-education integration

4.1 Further strengthen school-enterprise cooperation and enhance the value of enterprises

With the increasing social demand for high-end technical talents, there is a growing expectation for higher vocational colleges to cultivate "skill-oriented" talents. This requires higher vocational colleges to cooperate with enterprises deeply, particularly to strengthen the enterprise's talent training control ability. Enterprises must be fully integrated into the design and implementation of evaluation content to improve the main position and function of them. In terms of the design of evaluation content, enterprise mentors should be involved in the formulation of course programs. They could transform real business scenarios from enterprises into evaluation platforms, and clearly define project delivery standards according to industry requirements, ensuring that the course evaluation content seamlessly aligns with industry needs. Furthermore, courses can be customized according to the needs of enterprises, such as by implementing modern apprenticeships and order-based classes, where both schools and enterprises jointly develop training programs and evaluation standards, ensuring that the talents cultivated by schools better meet the actual needs of enterprises. In the implementation of evaluations, it's necessary to emphasize the initiative of enterprises and increase their weight in the evaluation process. The course assessment methods can be diversified by incorporating common practices from enterprises, such as customer negotiation simulations, project bidding, product design, and presentations. Both schools and enterprises should collaborate in executing the course plans, supervise each other, and work together to improve the evaluation outcomes through practical experience.

4.2 Improve the evaluation index system and strengthen the practice and comprehensive quality evaluation

Based on the goal of improving students' comprehensive quality, our team have expanded the original theoretical-based evaluations to incorporate real-world production scenarios and technical application needs from enterprises. This expansion includes practical and vocational-oriented evaluation indicators, enabling effective assessment of students' comprehensive abilities through quantifiable and observable records. We proposed five categories of indicators: Project Practice, Technology Application, Business Standards, Problem Solving, and Mental Literacy.

The Project Practice indicators are used to evaluate students' proficiency and compliance in completing standardized operations in real projects in enterprises, and examine their ability to manage the entire project process, including task decomposition, process control, resource coordination, and the ability to deliver results. The Technical Application indicators focus on students' knowledge transformation ability, particularly in mastering new technologies, new processes, and new products in the industry. That is, whether they can apply theories and standards to practical projects, or effectively complete the understanding and migration of knowledge. The Business Standards indicators evaluate students' practice of industry rules, safety standards and professional ethics, assessing whether they have mastered the required norms and monitoring their moral standards and behavioral virtues at the same time. In addition to basic ability assessments, evaluation indicators that go beyond standardized behavior, namely Problem Solving indicators, are set up to examine students' comprehensive control over complex situations, their ability to respond to emergencies, and their innovation in optimizing existing processes and technologies. The Mental Literacy indicators are variables based on different job requirements. For example, accounting requires meticulousness and rigorousness, marketing requires activeness and pressure-resistance, and aesthetics and creativity are extremely valued in design companies.

4.3 Establish a dynamic adjustment evaluation implementation mechanism to gradually resolve the contradictions between schools and enterprises

As previously mentioned, there are certain differences between schools and enterprises in curriculum

evaluation. Therefore, it is necessary to establish a dynamic adjustment mechanism to promptly identify and address contradictions, and to balance the interests of all parties. Firstly, align the evaluation goals. The course evaluation content should be compared with industry standards and job requirements, and the docking rate should be evaluated regularly to update the practical assessment content and ensure that the evaluation system is in sync with industrial development. Secondly, establish a shared platform for process evaluation to create a channel for real-time feedback and evaluation from schools, enterprises and students, enhancing communication and coordination efficiency. Finally, implement an incentive mechanism that integrates mutual benefits. From school's perspective, adjust the evaluation focus based on employment conditions, such as enterprise retention rates and salary levels, to improve the employment rate of graduates. From the perspective of enterprises, through policy measures, enterprises can be encouraged to participate in evaluation and talent cultivation by means of high-quality talent supply, venue and fund support. At the same time, this can help enterprises optimize their post training systems and reduce staff training costs.

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