

Original Paper

Research on the Implementation Path of Industry-Education Integration from the Perspective of Educational Power

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Abstract

By gradually improving the policy system and exploring innovative typical models, the deepening integration of industry and education in vocational education has become an important measure to improve the quality of technical and skilled personnel supply and serve the construction of a strong educational country in China, which helps to strengthen the service function of vocational education, enhance the advantages of vocational education types and upgrade the industrial structure. However, in the process of practice, there are still some practical difficulties, such as the “last mile” of the implementation of the policy of integration of industry and education in vocational education has not yet been opened, the supply and demand channels of integration of industry and education are more “quantity” than “quality”, and the endogenous motivation of enterprises to participate in vocational education is insufficient. It is urgent to promote the reform of “management and evaluation” of industry-education integration to build a policy chain landing mechanism, implement multi-collaborative governance to promote the operation of industry-education integration entities, and realize the co-construction, co-governance and sharing of the government, universities and enterprises to stimulate the internal motivation of enterprise participation.

Keywords

education power, vocational education, Integration of industry education

In April 2025, the Central Committee of the Communist Party of China and the State Council issued the Outline of the Plan for Building a Strong Country through Education (2024-2035), which proposed to build a “vocational education system integrating industry and education”, emphasizing the need to “speed up the construction of a modern vocational education system and focus on training craftsmen, skilled craftsmen and highly skilled personnel in large countries”. As an important part of the national education system and human resources development, the high-quality development of vocational education is directly related to the achievement of the goal of strengthening the country through education. Deepening the integration of industry and education in an all-round way is not only the realistic demand of the development of Vocational education, but also the key path to realize the high-quality development of Vocational education.

From the strategic perspective of building a strong educational country, the integration of industry and education is an important institutional link between the education system and industrial development. It can not only effectively strengthen the synergistic relationship between education and industry, optimize the structure of talent supply and demand, and enhance the ability of vocational education to serve economic and social development; It also helps to solve the structural contradiction between education and employment, and promotes the formation of a more closely linked training system for technical and skilled personnel. This integration mechanism of education chain, talent chain, industry chain and innovation chain is an important manifestation of the realization of high-quality and efficient education supply in the construction of a strong educational country in the new era. Based on this, in-depth exploration of the optimization path of the implementation of the integration of industry and education in vocational education is not only a practical demand to respond to the practical challenges of vocational education, but also a theoretical exploration to implement the strategic deployment of strengthening the country through education. Based on the reality of China’s vocational education reform, this paper combs the reform achievements, analyzes the practical problems, and puts forward targeted optimization strategies, in order to provide reference for speeding up the construction of modern vocational education system with Chinese characteristics.

1. The value implication of the integration of industry and education under the strategy of strengthening the country through education

Building a strong educational country is one of the core strategies of China’s high-quality development in the new era. Vocational education, as an important type of education for the training of technical and skilled personnel, plays a fundamental and supporting role in it. As the key path of the construction of modern vocational education system, the deep logic of the integration of industry and education lies in the organic connection between education chain and industry chain, talent chain and innovation chain, so as to realize the high matching and linkage between education system and economic and social development. From the perspective of the strategy of strengthening the country through education, the

value of the integration of industry and education is mainly embodied in three aspects(as shown in Figure 1).

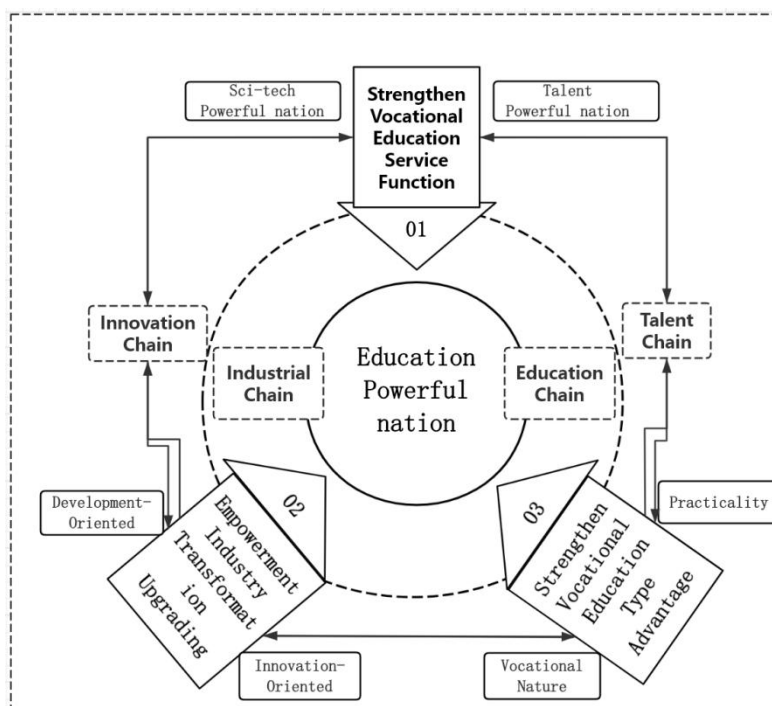


Figure 1. Value Implication of Industry-Education Integration

1.1 Strengthen the Service Function of Vocational Education and Enhance the National Strategic Support Capacity

On October 16, 2022, the report of the 20th National Congress of the Communist Party of China emphasized for the first time that education, science and technology and talents are the basic and strategic support for building a socialist modern country in an all-round way, and that we should speed up the construction of a strong country in education, science and technology and talents. Among education, science and technology and talents, education plays a decisive role. Scientific and technological innovation and personnel training depend on the development of education. Therefore, we must insist on giving priority to building a strong educational country as an important first step to promote the development of various undertakings of the Party and the state. The essence of building a strong educational country is to enhance the ability of the education system to support the overall national strategy through a systematic talent training system, especially in the stage of high-quality development, technical and skilled personnel have become an important component of the core competitiveness of the country. As the main channel of technical and skilled personnel training, the development level of vocational education directly affects the response speed and support ability of the

country to major strategies such as scientific and technological innovation, high-end manufacturing, regional coordination and so on.

As the core mechanism of strengthening the national strategic ability of vocational education, the integration of industry and education is an important way to promote the deep coordination between education and industry, and to connect the chain of personnel training and scientific and technological innovation. On the one hand, by breaking the barriers between education and industry, it promotes the precise docking of “education chain” and “talent chain” with “industry chain” and “innovation chain”, so that vocational education can continuously provide high-quality skilled personnel for key areas of the country. On the other hand, the integration of industry and education also promotes enterprises to participate in the process of educating people in depth through the platforms of modern apprenticeship, municipal industry-education consortium, industry-education integration community and industrial colleges, so as to enhance the ability of education to train compound talents, and enhance the support of education for major national technological research and regional economic layout. Therefore, strengthening the integration of industry and education and enhancing the core role of vocational education in serving the strong country of human resources and science and technology are important ways to build a strong country of education.

1.2 Deepening the Mechanism of Integration of Industry and Education and Enhancing the Advantages of Vocational Education Types

The National Vocational Education Reform Implementation Plan points out that we should “adhere to the orientation of type education and promote the coordinated development of vocational education and general education”, and establishes that vocational education is a form of education with unique type attributes, whose core characteristics lie in emphasizing practice-oriented, competency-based and employment-related. In order to promote the construction of a strong educational country in the new era, we must build a modern vocational education system with Chinese characteristics and reflecting the essence of the type, so that it can go hand in hand with general education and show its strengths. The integration of industry and education is the key mechanism to support the deepening development of the orientation of vocational education types. On the one hand, the integration of industry and education helps to build a curriculum system and teaching mode with ability as the core. Through the construction of the comprehensive education system of “post class competition certificate”, the knowledge imparting, ability training and professional post requirements of vocational education are integrated, and the logic of teaching reform oriented by practical problems is formed. This kind of curriculum reform based on industry standards and enterprise posts has promoted vocational education from the traditional subject type to the post type and task type, effectively highlighting the professional and practical nature of vocational education. At the same time, the integration of industry and education constantly improves the multi-education structure of vocational education through system coordination and platform construction. New organizational forms such as “industry-education consortium”, “industrial college” and “school-enterprise cooperation alliance” are promoting the development mode

of vocational education to achieve regional coordination, industry co-ordination and school-enterprise linkage. Through co-construction of specialties, co-compilation of teaching materials, co-assignment of teachers and co-establishment of courses, the integration of industry and education broadens the growth channels and development space of vocational education talents, and makes its functions clearer and its characteristics more distinct in the type education system.

1.3 Enabling Industrial Transformation and Upgrading to Release the Economic Momentum of Vocational Education

The proposal of “modern industrial system” and “new quality productivity” indicates that industrial development has changed from “resource-capital” to “technology-talent”. In this new stage, through the integration of industry and education, vocational education can not only provide stable talents for industrial development, but also promote the penetration of industrial standards, technological processes and technological upgrading into the education system, so as to realize the two-way empowerment of education and economic development. Through the establishment of talent cultivation mechanism of “professional cluster docking industry cluster” and “curriculum chain service industry chain”, the integration of industry and education can enable vocational colleges to dynamically adjust professional settings and teaching contents according to regional development priorities and industrial needs, realize the integration of production, production and education, and promote vocational education and regional economy. In order to effectively solve the structural mismatch problem that has plagued vocational education for a long time, and enhance the contribution of education to regional economy. In addition, in the process of building technology platforms, training bases and production, teaching and research centers with enterprises, vocational colleges can gradually embed the enterprise R&D system and product iteration chain, and become the intermediate force of technology dissemination, achievement transformation and talent incubation. Vocational education has been transformed from simple employment-oriented to development-oriented and innovation-oriented, which strengthens its basic position in the modern industrial system and effectively improves the supporting capacity of the education system for industrial innovation. It can be seen that the construction of the mechanism of deep integration of industry and education is the core path for vocational education to serve economic and social development, and is also the basic force for the continuous evolution of modern industrial system.

2. Effectiveness of the Integration of Industry and Education in the Process of Building a Strong Educational Country

Under the background of accelerating the construction of a strong educational country, the integration of industry and education, as a key hub to open up the education chain, talent chain, industry chain and innovation chain, has achieved remarkable results through the iterative upgrading of the policy system and the innovative breakthrough of the practice mode.

2.1 Combination and Linkage to Gradually Improve the Policy System of Integration of Industry and Education

From the macro-layout at the national level to the implementation at the local level, from the pilot construction of industry-education integration cities, industries and enterprises to the construction of city-level industry-education consortia, China has built a systematic and complete policy system of industry-education integration.

Firstly, multi-departments jointly formulate relevant policies for the integration of industry and education, and build a policy closed-loop of “top-level design-pilot promotion-incentive guarantee” for the development of the integration of industry and education. In December 2017, the General Office of the State Council issued “Several Opinions on Deepening the Integration of Industry and Education”, which extended the integration of industry and education to the construction of “double first-class initiative” universities, and since then it has become the guideline for all types of universities, clarifying the overall requirements, main objectives and key tasks of deepening the integration of industry and education, and laying a policy foundation for the deep integration of industry and education. In October 2019, the National Development and Reform Commission, the Ministry of Education and other six departments issued the National Pilot Implementation Plan for the Integration of Industry and Education, proposing the first batch of pilot construction of about 20 cities with integration of industry and education. Start the second batch of pilot projects in time, cultivate a number of industry-education integration industries with unique regional characteristics, build more than 10000 industry-education integration enterprises, and build a sound industry-education integration enterprise system and combined incentive policy system. Subsequently, the National Development and Reform Commission, the Ministry of Education and other six departments jointly issued the Notice on the Issuance of the National Pilot Implementation Plan for the Integration of Industry and Education, requiring provincial governments and pilot cities to focus on the innovation of the system and mode of the integration of industry and education, and to promote the pilot work as a whole. In April of the same year, the National Development and Reform Commission and the Ministry of Education issued the Implementation Measures for the Construction of Industry-Education Integration Enterprises (Trial Implementation), which made it clear that enterprises entering the certification catalogue of Industry-Education Integration Enterprises would enjoy the combined incentives of “Finance with Land and Credit” and related tax preferential policies, so as to fully mobilize the enthusiasm of enterprises to participate in the integration of industry and education.

Secondly, lay the foundation of multiple participation in vocational education from the top-level design level, and build a co-governance institutional framework for the integration of industry and education. In April 2023, the General Office of the Ministry of Education issued the Notice on the Construction of Municipal Industry-Education Consortium, which proposed that "based on industrial parks, a number of Municipal Industry-Education Consortium with the functions of personnel training, innovation and entrepreneurship, and promoting high-quality development of industrial economy should be built". In

July 2023, the Ministry of Education issued the Notice on Supporting the Construction of the Industry-Education Integration Community of the National Rail Transit Equipment Industry, taking the lead in exploring the establishment of a set of industry community management system, construction mode and operation mechanism in the national rail transit equipment industry. Subsequently, it issued the Guidelines for the Construction of Industry-Industry-Education Integration Community, opened the project declaration of Industry-Industry-Education Integration Community, and formally entered the substantive operation. In October 2024, the General Office of the Ministry of Education issued the Notice on Strengthening the Construction of the Municipal Industry-Education Consortium, aiming at improving the construction level and quality of the Municipal Industry-Education Consortium, and issued the Standards for the Construction of the Municipal Industry-Education Consortium(Trial Implementation)to track, monitor and dynamically manage the whole process. In 2025, the Outline clearly put forward the idea of “building a strong city-wide industry-education consortium, industry-industry-education integration community, optimizing the layout of vocational education in coordination with regional development and linking up with industrial layout”.

2.2 Combining Points with Areas to Explore the Typical Mode of Deep Integration of Industry and Education

With the continuous improvement of the policy system of integration of industry and education, practical exploration has become the key link to promote the deep integration of industry and education. Through the strategy of “point breakthrough and surface promotion”, China has carried out diversified exploration according to local conditions.

Firstly, we will build a pilot city for the integration of industry and education, and establish a synchronous linkage mechanism between the integration of industry and education and economic and social development. On the one hand, pilot reforms should be carried out according to regional economic development. In October 2019, the state launched the first batch of 21 pilot industry-education integration cities, covering Tianjin Jinnan District, Tangshan City, Hebei Province and other areas, of which the eastern region accounted for 52.4%, the western region accounted for 19%, the central region accounted for 23.8%, and the northeastern region accounted for 4.8%. This is in line with the development of the eastern coastal areas with developed economy and strong industrial and agricultural foundation. In 2023, the National Development and Reform Commission and other eight departments jointly issued the Action Plan for Promoting the Integration of Industry and Education in Vocational Education (2023-2025), which clearly States that by 2025, the number of pilot cities for the integration of industry and education will reach about 50, and the number of pilot cities will increase by about 30. On the other hand, the pilot cities are inclined to key industries through capital investment and resource allocation to train technical and skilled personnel to support regional development. According to the special audit report of the Ministry of Finance in 2024, the first 21 pilot cities of industry-education integration at the national level have invested a total of 85.03 billion yuan in special funds, which are inclined to key industries. Among them, Ningbo, Qingdao and Hefei

accounted for 35% of the total investment, focusing on building industrial education clusters such as “Intelligent Network United Automobile”, “High-end Home Appliances Manufacturing” and “Integrated Circuit”. For example, Hefei “China Sound Valley-Vocational Education Park” as a landmark project, the state arranges 50 million special industrial funds every year, Anhui Province and Hefei City arrange special supporting funds according to the ratio of 1:1:3 to support industrial development. At the same time, a set of industrial policies are formulated, and two major policy service systems of “financial innovation and market promotion” are innovatively established. The park environment, park support, family members of talents entering the park are supported in an all-round way. Relying on the talent market of Anhui, it gives priority support to the needs of all kinds of talents of enterprises.

Secondly, we should build a number of city-level industry-education consortia and industry-education integration communities to serve the transformation and upgrading of regional industries. In 2023, the Ministry of Education first selected and constructed 28 municipal industry-education consortia nationwide, and in 2024, six new national industry-education consortia were established, which promoted the construction of 237 provincial-level industry-education consortia and enhanced the “closeness” of the integration of vocational education and local economy. At the same time, in July 2023 and July 2024, two national-level industry-education integration communities, namely, the national rail transit equipment industry and the national non-ferrous metal industry, were established, which led to the construction of more than 1100 industry-education integration communities in all walks of life, and enhanced the adaptability between vocational education and industry development needs.

The municipal industry-education consortium plays the overall role of the government of the industrial park, promotes the cooperation between the park enterprises and relevant schools and institutes, carries out technical research and personnel training, and improves the ability and accuracy of vocational schools to serve the local economic development. The Pujiang Municipal Industry-Education Consortium, based on the Pujiang Economic Development Zone, is the only national-level Municipal Industry-Education Consortium built at the county level in China, with 58000 students enrolled, 19000 full-time graduates trained and 56000 social training conducted in 2023, contributing to 1289 industry-university- research cooperation projects, with an investment of over 1 billion yuan. Provide multi-level and full-cycle skilled personnel support and technical services for all kinds of enterprises in Jinjiang. The public service platform of Changzhou New Energy Industry-Education Consortium released 428 scientific and technological achievements in 2024, held 21 offline technology supply and demand docking meetings, excavated 216 technical needs, and solved 116 technical needs. The member colleges and universities of the consortium served more than 600 local enterprises in Changzhou, and 396 new authorized patents were added. At the same time, the consortium issued a list of talent demand, school-enterprise joint employment supply and demand talks, providing more than

9200 jobs for students in the new energy industry, and more than 6000 students to achieve counterpart employment.

The industry-education integration community focuses on giving full play to the cross-regional leading role of state-owned enterprises, local leading enterprises and chain-leading enterprises, and concentrating high-quality resources in the industry to improve the overall quality of industrial personnel training. The two state-level industry-education integration communities highlight their strategic position, scale advantages and leading role. By organizing colleges and universities, vocational schools and enterprises to form teaching teams and build teaching resources, they will focus on building 80 majors, developing 270 professional core courses and 330 high-quality teaching materials, building 200 production practice centers and 280 productive training projects. The large-scale state-owned enterprises and central enterprises represented by China National Automobile Group Co., Ltd. and China Aluminum Group Co., Ltd. have taken active actions to build platforms, mechanisms and strong measures through the integration of technology, talents, resources and culture between schools and enterprises, so as to construct the integration of schools and enterprises, the full integration of production and education, the organic integration of education and training, and the cooperation between schools and enterprises. It provides a model for leading enterprises to participate in the organization of high-quality vocational education. The integration of industry and education in regional industries reflects the characteristics of fast construction and large scale. The proportion of local industry-education integration communities registered in the eastern, central and western regions is 48.6%, 26.4% and 25.0%, respectively, covering almost all the industry classifications of the national economy, with the proportion of major industries reaching more than 95%.

3. The Practical Dilemma Faced by the Implementation Process of Integration of Industry and Education under the Background of Education Power

Under the background of deepening the strategy of strengthening the country through education, the integration of industry and education, as a key link between the education chain and the industrial chain, has become increasingly important. As an important carrier of the integration of industry and education, vocational colleges undertake the important mission of providing high-quality technical and skilled personnel for industrial transformation and upgrading. Despite the continuous improvement of the policy system at the national level and the initial success of local pilot exploration, there are still many deep-seated contradictions and practical challenges in the implementation of the integration of industry and education, which restrict its function and efficiency.

3.1 The Integration of Industry and Education in Vocational Education Is facing Difficulties in Policy Implementation

As the key hub of policy implementation, the implementation efficiency of the grass-roots government directly determines the landing effect of the policy. At present, in the process of promoting the

integration of industry and education, the “last mile” problem of policy implementation is frequent, reflecting the deep contradiction between policy implementation and realistic needs.

Firstly, school-enterprise cooperation faces obstacles to policy implementation, which are mainly reflected in the absence of property rights system, the failure of tax incentives and the high cost of implementation. At the level of property rights system, the current policies and regulations related to the integration of industry and education do not clearly stipulate the definition of property rights, the transfer of ownership and the distribution of benefits in school-enterprise cooperation. As a public institution, the assets of the school are mostly state-owned, and the property rights are clear. However, it is difficult to clarify the ownership of property rights of equipment, technology, sites and other assets invested by enterprises in the process of school-enterprise cooperation. The absence of property rights system leads to more disputes between the two sides in asset accounting, profit distribution and other links, which weakens the enthusiasm and stability of cooperation between schools and enterprises. At the level of tax incentive failure, although the state has issued a series of preferential tax policies to encourage school-enterprise cooperation, there are some problems in the actual implementation process, such as vague scope of policy application and complex approval process. Some enterprises reflect that it is difficult to accurately judge whether their business meets the conditions of tax preferences, and the application for tax preferences requires a large number of supporting materials and multi-level approval, which is often time-consuming and labor-intensive, and may fail, which makes many enterprises hesitate. In terms of implementation cost, from negotiation and contract signing in the early stage of cooperation, to asset integration and system construction in the middle stage, to operation and management in the later stage, every link needs to invest a lot of manpower, material and financial resources. The high cost of implementation makes both schools and enterprises face greater economic pressure in the process of cooperation, especially some small and medium-sized enterprises and schools with tight funds, which limits the extensive development of school-enterprise joint-stock cooperation.

Secondly, there are structural defects in the current evaluation mechanism of integration of industry and education, which lead to difficulties in policy implementation. First, in the construction of evaluation indicators, too much emphasis is placed on quantitative indicators and quality indicators are neglected. For example, more attention has been paid to the number of cooperative projects, the amount of capital investment and the number of student internships, while less attention has been paid to the indicators reflecting the quality and connotation of the integration of industry and education (the innovation of school-enterprise cooperative curriculum development, the fit between talent training programs and industrial needs, the transformation and application of technological research and development achievements, etc.). This evaluation orientation of emphasizing quantity over quality will lead schools and enterprises to pursue only short-term achievements and interests, thus ignoring the role of evaluation in the process of integration of industry and education, which makes it difficult for the policy to really promote the deep coordinated development of vocational education and industry in practice. Second, the evaluation subject is relatively single. At present, the evaluation of integration of

industry and education is mostly dominated by government departments and schools, and the participation of enterprises, trade associations and other important stakeholders is low. The evaluation perspectives of the government and schools tend to focus on education and teaching management and personnel training, while the evaluation opinions of enterprises on talent quality, technology demand and cooperation benefits, which are the direct representatives of industrial demand, are difficult to fully integrate into the evaluation system. This single evaluation subject makes the evaluation results unable to fully reflect the actual effect of the integration of industry and education, and it is difficult for policy makers to obtain real and effective feedback information, which ultimately affects the targeted adjustment and precise landing of policies. Thirdly, the assessment method is mainly short-term, and it is difficult to comprehensively examine the long-term benefits and sustainability of the integration of industry and education. The integration of industry and education itself is a long-term dynamic process, which takes a long time to show its effectiveness from specialty setting, curriculum development and personnel training to technological innovation and achievement transformation, but the current evaluation of integration of industry and education is mostly based on one academic year or one project cycle. Short-term assessment methods will make schools and enterprises more inclined to carry out projects that are easy to achieve results in the process of cooperation, but lack enthusiasm for projects with long-term value but large investment and long cycle, which also runs counter to the goal of promoting the high-quality development of vocational education by the policy of integration of industry and education, making it difficult for relevant policies to achieve the desired results.

Thirdly, the imbalance of regional allocation of vocational education resources restricts the balanced development of education and the coordinated upgrading of industry, which is manifested in the significant regional differences of school-enterprise cooperation resources such as hardware facilities, teachers and cooperation opportunities. Developed areas rely on strong economic strength to invest heavily in the construction of vocational colleges, often attract many excellent professional teachers and enterprise technical personnel with advanced teaching facilities, and also easily rely on the advantages of industrial agglomeration to carry out in-depth cooperation with enterprises to form a good integration of industry and education ecology. However, due to the shortage and aging of training equipment in vocational colleges, insufficient number of teachers and low educational level, and lack of enterprise resources in underdeveloped areas such as the central and western regions, school-enterprise cooperation is easy to become superficial and difficult to truly implement the integration of industry and education. This imbalance not only undermines educational equity, but also hinders the coordinated development of regional industries and balanced economic growth. Therefore, it is urgent for the government to increase policy and financial support for underdeveloped areas, improve the talent incentive mechanism, and promote pairing assistance cooperation in vocational education between developed and underdeveloped areas, so as to realize resource sharing and complementary advantages.

3.2 The Operation Mechanism of the Integration of Industry and Education Is Empty and the Function Orientation Is Single

In recent years, under the guidance of policy promotion and reform, vocational colleges have actively explored diversified modes of industry-education integration, such as industrial colleges, vocational education groups, municipal industry-education consortia, and industry-education integration communities. Through the development of these platforms, a multi-level, multi-regional and multi-subject integration pattern has been initially established, the number of which has increased significantly, the coverage has continued to expand, and the subjects of cooperation have become increasingly diverse. However, from the overall operation effect, the current integration of industry and education has obvious problems of “emphasizing construction over effectiveness” and “emphasizing quantity over quality”, the integration mechanism has not yet moved from organizational construction to substantive coordination, and there are still deep obstacles in the system operation level of supply and demand docking channels, which are manifested in many aspects, such as the weakening of cooperation mechanism and the single function orientation.

Firstly, some platforms for integration of industry and education are not built, relying too much on “listing” and “co-construction” projects, lacking in-depth exploration of cooperation mechanism, and there is an obvious tendency of formalization. Taking industrial colleges as an example, some colleges and enterprises set up nominal offices quickly after the signing of the agreement, but they still do things in their own way in daily operation, and have not expanded their cooperation to the deep level of resource sharing and curriculum development. Teachers and students of the 66th Training Course for Young and Middle-aged Cadres in Colleges and Universities of the National Institute of Educational Administration set up a research group to carry out a survey on the current situation of industrial colleges in higher vocational colleges, and found that 77.24% of the industrial colleges in 375 higher vocational colleges in 31 provinces (autonomous regions and municipalities directly under the Central Government) did not have independent legal personality. The organizational structure is generally attached to the school administrative system, lacking the independent governance mechanism and performance evaluation system for market-oriented operation. This loose organizational model of “school setting as the main and enterprise participation as the supplement” leads to the superficial participation of enterprises in school-enterprise cooperation projects, which makes it difficult to form a stable and long-term mechanism of joint education and technical cooperation.

Secondly, at present, most industry-education integration platforms still take supporting traditional talent training as their core function, and have not yet formed a comprehensive service system covering the whole process of industry-university-research and innovation, which makes the comprehensive benefits of the platforms insufficient and the functions single. In the established industrial colleges, the cooperation content is mainly in the form of order classes, work-study combination, enterprise internship and so on, which promotes the innovation of talent training mode to a certain extent, but the collaborative ability in curriculum development, technology research and development, achievement

transformation, social services and other aspects is obviously insufficient. Survey data show that although 71.06% of industrial colleges have carried out different degrees of reform and innovation in personnel training mode, only 29.88% of them can undertake the service function of production, teaching and research at the same time, forming an unbalanced development pattern of "emphasizing education, neglecting research and development" and "emphasizing teaching, neglecting transformation". Under this mode, the depth and breadth of vocational education docking industry demand are limited, and it is difficult to support the multi-dimensional development needs of regional economic and technological progress.

3.3 There Is no Unified value Consensus and Goal Orientation among the Subjects, and the Endogenous Motive Force of Enterprise Participation Is Insufficient

Despite the continuous release of incentive signals at the policy level, there is no unified value consensus and goal orientation among the government, schools, industries, enterprises and other multiple subjects in the process of promoting the integration of industry and education. All parties often participate in cooperation based on their own interests and lack of deep recognition of the concept of "symbiosis and co-prosperity", which leads to short-term cooperation goals and utilitarian behavior, and makes it difficult to form a sustainable and stable coordination mechanism. Especially in the case of insufficient motivation for enterprises to participate and the disconnection between school education objectives and industrial needs, the integration of industry and education is easy to fall into the dilemma of "formalization" and "superficialization".

Firstly, there is an imbalance between the risks and benefits of enterprises. Enterprises need to invest a lot of money in equipment renewal, staff teaching, but also bear potential risks such as production interruption and technology leakage, and because of the long training cycle, enterprises can not get manpower supplement and benefit transformation in the short term, and there are many uncertainties in the market application of technological research and development achievements, which leads to enterprises in the integration of industry and education. This greatly weakens the enthusiasm and sustainability of enterprise participation. A listed company has set up a subsidiary company of integration of industry and education, and signed contracts with more than 50 secondary and higher vocational colleges to establish training bases. However, due to the definition of property rights, all the contracts signed with public vocational colleges were cancelled, which not only lost the agreed tuition fee share and financial subsidies, but also failed to recover the funds invested in the early stage, resulting in a serious imbalance between investment and income.

Secondly, the dislocation of policy incentives further aggravates the passivity of enterprises. Most of the existing policies are based on external incentives, such as tax relief and financial subsidies, but they fail to deeply bind the core interests of enterprises, such as technological upgrading and market expansion, with vocational education. Although the proportion of equipment investment subsidies to enterprises in some areas is up to 30%, it does not guide enterprises to obtain sustainable benefits through technology equity, curriculum development and other means, and the incentive means remain

at the level of cost compensation, rather than at the level of revenue creation. In addition, enterprises always lack the right to speak in the core links of education and teaching, such as specialty setting and curriculum development, which makes it difficult for personnel training and industrial demand to resonate at the same frequency. The demand for 5G base station maintenance courses put forward by an electronic enterprise has been delayed for 18 months due to the long adjustment cycle of the syllabus of colleges and universities. The market demand of enterprises can not be translated into teaching content in time. The disconnection between policy incentives and the actual needs of enterprises weakens the willingness of enterprises to participate actively.

Thirdly, the ambiguity of governance powers and responsibilities makes it difficult for enterprises to really play the main role in the integration of industry and education. Firstly, the agreement on key issues such as training safety, ownership of intellectual property rights and distribution of results in school-enterprise cooperation agreements is generally vague, which leads to frequent disputes. If the CNC processing technology developed by a mechanical enterprise in cooperation with colleges and universities is used by a third party without authorization, the enterprise has to bear all the litigation costs alone because the agreement does not specify the responsibility of safeguarding rights. Secondly, the decision-making mechanism of most industry-education consortia and industrial colleges is dominated by colleges and universities, and the proportion of enterprise representatives in the Council seats is only about 20%. They lack substantive voting rights on major issues such as professional adjustment and the use of funds, and can only passively participate in cooperation, which makes it difficult to formulate personnel training objectives, design curriculum system and establish training standards. This marginalized governance status further frustrates the enthusiasm of enterprises to participate, and makes the integration of industry and education fall into the embarrassing situation of “hot school and cold enterprise”.

4. Systematic Optimization Strategies to Promote the Integration of Industry and Education

In view of the realistic dilemma in the process of integration of industry and education in vocational education, based on systematic thinking, the optimization path of integration of industry and education can be explored from at least three dimensions (Figure 2).

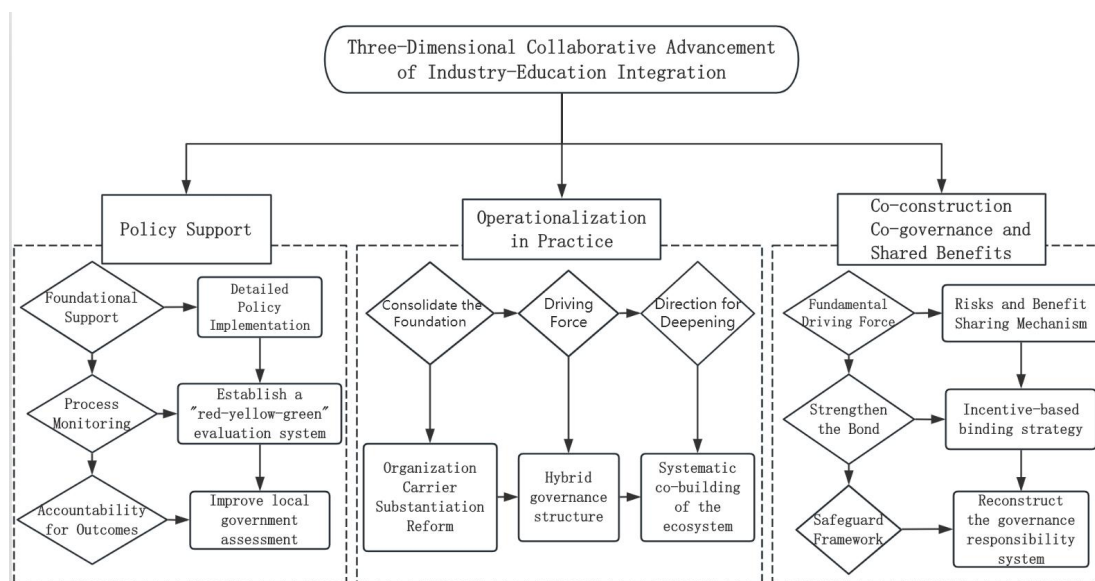


Figure 2. Optimization Path of Industry-Education Integration

4.1 Promote the Reform of "Management and Evaluation" of the Integration of Industry and Education, and Build a Policy Chain Landing Mechanism

To solve the "last mile" problem of policy implementation, the key lies in reshaping the governance system of integration of industry and education. Through deepening the collaborative innovation of management system, school-running mode and evaluation system, breaking departmental barriers, optimizing resource allocation and strengthening dynamic supervision, the policy of integration of industry and education will be transformed from "paper planning" to "practical efficiency", so as to lay a solid institutional foundation for the high-quality development of Vocational education.

Firstly, detailed policy operational guidelines. First, detailed implementation rules should be formulated to ensure the smooth implementation of multi-subject collaborative education. It is necessary to clarify the key rules of asset evaluation, equity allocation and exit mechanism in the process of school-enterprise joint venture, and actively explore the management mode of "government trusteeship+enterprise operation" to ensure clear property rights. By improving the mechanism of asset evaluation and equity allocation, the problem of unequal rights and responsibilities in school-enterprise cooperation can be effectively solved. Second, we should innovate the synergy between preferential tax policies and the reform of the approval process. Simplify the application process of preferential tax policies, and implement the system of one-window acceptance and parallel examination and approval. Reduce the cost of enterprise policy acquisition. At the same time, a data platform for the integration of industry and education is established to realize the interconnection and interoperability of the databases of the three departments of education, taxation and industry and telecommunications, and to automatically verify the authenticity of the materials submitted by enterprises through data sharing, so as to further improve the efficiency of examination and approval and consolidate the achievements of

process reform. Third, we should strengthen the credit-driven mechanism of the policy of “exemption from application and enjoyment” and build a policy synergy ecology. Establish a credit file system for the integration of industry and education, incorporate the data of enterprises participating in the integration of industry and education into credit evaluation, and form a linkage with the optimization of approval process and the construction of data platform. For cooperative enterprises with outstanding performance, the preferential policy of “exemption from application and enjoyment” is implemented. For example, enterprises with AAA credit rating (including receiving more than 100 interns for three consecutive years and R&D investment accounting for more than 5%) automatically enjoy preferential policies such as tax credit and land priority. Through the application of credit evaluation results, enterprises are encouraged to actively participate in the integration of industry and education, and at the same time, the dynamic management of credit information is realized by means of data platform, so as to ensure the precise implementation of the policy of “exemption from application and enjoyment” and form a virtuous circle of policy coordination to promote the integration of industry and education.

Secondly, we should build a scientific and accurate “red, yellow and green light” evaluation system to enhance the scientificity and operability of the evaluation. It is suggested that the Ministry of Education should take the lead in building a national index framework, with the participation of industry associations, leading enterprises and experts from colleges and universities, and establish a three-level index system covering “participation degree-process management-result effectiveness”. In the design of indicators, we should shift from the traditional quantity orientation to the comprehensive quality orientation, instead of focusing on the single data such as “the number of cooperative enterprises”, and comprehensively consider the key indicators such as the participation rate of enterprises, the employment rate of graduates, the frequency of curriculum updating, and the degree of job matching, so as to achieve the goal of “the number of cooperative enterprises”. It also introduces indicators reflecting the effectiveness of cooperation, such as the intensity of enterprise investment (such as the proportion of annual vocational education funds to enterprise revenue) and the difference in starting salaries of graduates (compared with non-cooperative institutions). In terms of regional assessment criteria, we should combine the differences of industrial structure between the East and the West and the basis of enterprise development, set the evaluation weights of classification and classification, and enhance the fairness of the system and the effectiveness of incentives.

In order to ensure the authenticity and reliability of the evaluation data, we can explore the introduction of digital technologies such as blockchain and data label encryption, and link up the key link data such as enterprise equipment donation records, students’ training process and post conversion rate, so as to prevent data fraud and “paper cooperation”. At the same time, a dynamic early warning and graded response mechanism should be established. Once the actual participation rate of enterprises in the region is found to be less than 30%, or the failure rate of key equipment investment is higher than 40%, the red light warning will be triggered and the deadline for rectification will be initiated. For areas entering the “yellow light” interval, collaborative supervision mechanism and expert consultation

mechanism can be arranged to intervene in advance to prevent the spread of problems. In addition, a special guiding fund for rectification should be set up to support the improvement of backward regions or weak links, and enterprises should be encouraged to participate continuously through differentiated tax preferential policies, so as to truly build a closed-loop quality management system of “monitoring-early warning-intervention-feedback” and promote the integration of industry and education to be institutionalized, standardized and effective.

Thirdly, we should improve the performance-oriented assessment mechanism of local governments and enhance the internal driving force of policy implementation. The implementation quality of the policy of integration of industry and education should be formally incorporated into the performance appraisal system of local governments, and a weight of no less than 10% should be set. This proportion is between the current “double-creation” index (usually 5%-8%) and the rural revitalization index (15%-20%), which can highlight the priority of the integration of industry and education in the strategy of strengthening the country through education without affecting other key inputs of people's livelihood. At the same time, we should strengthen the practical application of performance appraisal results and link them with policy tools such as financial transfer payments, special funds for education and land use indicators. For example, we can reduce the special subsidies for vocational education by 10% in areas where the integration of industry and education is not up to the standard, and force local governments to integrate the resources of education, human society, industry and telecommunications and other departments, so as to promote the formation of a cross-system and multi-subject coordinated work pattern.

In terms of assessment content, we can learn from the German “quality spiral” theory to build a quality monitoring system with dynamic feedback and continuous improvement. It is suggested that industry associations, trade unions, colleges and other units jointly set up a third-party evaluation team to conduct a “two-track evaluation” of on-the-spot evaluation and graduate development tracking every three years to ensure that the evaluation system pays attention to both project implementation and output results. In the field of strategic emerging industries such as integrated circuits and new energy, we can try out the multi-evaluation mechanism of “government guidance-industry leadership-participation of labor model studios”, which gives the front-line technical specialist substantive voice, and makes the evaluation closer to the front-line needs of the industry. At the same time, we should promote the construction of data-driven performance feedback mechanism. Through the establishment of a regional graduate career development database, we can dynamically track their performance in technological innovation, job promotion and career stability within five years, and feed back the data to relevant institutions and enterprises to promote the iterative updating of professional courses and personnel training programs. For enterprises with poor long-term evaluation effect and low quality of cooperation, an exit mechanism should be set up to cancel their eligibility for tax incentives or financial subsidies, thus forming a closed-loop incentive and restraint linkage system. In addition, it is suggested to introduce the resource allocation mode of “performance allocation” orientation, and to

explore the financial support mechanism of “index linkage+differential floating” by referring to the practical experience of the United States. By linking the amount of funds allocated by colleges and universities with key indicators such as the passing rate of students’ skills certification and the retention rate of graduates’ enterprises, the total amount of funds allocated can fluctuate by 30% around the benchmark value. In order to stimulate local enthusiasm, a “floating incentive fund” can also be set up to give 20% financial incentives to the top 10% of the regions in the performance of integration of industry and education.

4.2 Implementing Multi-collaborative Governance and Promoting the Operation of Industry-Education Integration Entities

Firstly, we should promote the transformation of industry-education integration organizations to the direction of materialization and consolidate their institutional and operational foundations. We should clarify the legal attributes of all kinds of industry-education integration platforms, take “quasi-corporatization” as the reform orientation, and give priority to the pilot projects of type positioning in representative organizations such as municipal industry-education consortia, industry-education integration communities and modern industrial colleges. By exploring the operation mechanism with independent legal status, we can promote the construction of relatively independent internal governance structure and operation rules, endow the organization with stronger autonomous operation ability, independent decision-making power and responsibility-sharing mechanism, so as to realize the transformation from administrative subsidiary to entity autonomy. At the same time, we should strengthen the top-level design of the system, provide clear policy support for organizational transformation, promote the adoption of local legislation or special documents, define the boundaries of rights and responsibilities of all parties involved, establish a standardized legal protection system, and ensure the steady progress and effectiveness of organizational entity reform. For example, Zhejiang Province takes Hangzhou Economic Development Zone (Qiantang Science City) as the carrier to promote the substantive construction of the industry-education consortium through the three-level organizational structure (Council, Secretariat, Expert Committee). In 2023, more than 30 joint government-school-enterprise consultations were held, 12 industrial colleges were established, and nearly 2000 talents were trained, which significantly improved the transformation of achievements and the effectiveness of school-enterprise cooperation.

Secondly, build an integrated governance system to enhance the effectiveness of multi-party synergy. We should actively explore the compound governance structure that combines the logic of corporate governance with the characteristics of bureaucratic management in colleges and universities, and reshape the allocation of rights and responsibilities and the operation mechanism of the integration of industry and education. By establishing a board of directors or a board of directors jointly participated by the government, enterprises, schools and scientific research institutions, we can clarify the boundaries of responsibilities and decision-making powers of the participants, break the institutional restrictions such as fragmentation and departmental barriers, and promote the governance system from

cooperative participation to co-construction and co-determination. Further improve the collaborative decision-making procedures and interest linkage mechanism to enhance the efficiency of organizational operation and the scientific nature of decision-making. At the level of system integration, it is necessary to standardize the internal process of the governance structure, build a clear and efficient coordination mechanism, protect the rights and interests of all parties, promote resource sharing and system coordination, and effectively enhance the overall governance capacity and effectiveness level of the industry-education integration platform.

Thirdly, deepen the integration of industry and education systems and promote ecological co-construction. Guided by the Outline of the Plan for Building a Strong Country in Education (2024-2035), we will promote the organizational innovation and functional expansion of the platform for the integration of industry and education, and realize the multi-dimensional integration of “production, learning, research and application”. Relying on industrial parks, vocational education parks and other agglomeration areas, integrating multi-resources to build a “government-school-enterprise-research park” co-construction mechanism, forming a “talent co-education, professional co-construction” and other “eight-party” integrated cooperation pattern, to create a complex functional operation entity. Strengthen system integration, coordinate regional industrial layout and education planning, improve school-enterprise cooperation, work-study integration and other integration modes, and build a system solution from personnel training to industrial support. By optimizing the regional layout, strengthening the platform construction and improving the system interface, we can stimulate the multiplier effect of vocational education in serving the regional economy.

4.3 Realizing Co-construction, Co-governance and Sharing, and Stimulating the Internal Motivation of Enterprise Participation

By building a community of interests guided by the government, led by schools and enterprises, and linked by many parties, we can break the traditional pattern of passive cooperation between enterprises. Starting from the dimensions of system design, rights and interests protection and resource sharing, the development needs of enterprises are deeply embedded in the whole chain of integration of industry and education, so as to build consensus, optimize ecology through co-governance, release vitality through sharing, truly activate the endogenous power of enterprises to participate in the integration of industry and education, and promote the formation of a new model of sustainable coordinated development of industry and education.

The first is to build a market-oriented core mechanism of “technology equity+performance sharing”. Through professional third-party evaluation agencies, the equipment and technology input of enterprises are accurately evaluated, and the proportion of shares is clearly defined and strictly limited to less than 30%, so as to ensure the rationality of the distribution of rights and interests of school-enterprise cooperation. At the same time, the dynamic adjustment mechanism is introduced to flexibly adjust the proportion to 3%-10% according to the multiple indicators such as the passing rate

of student skill certification and the income of enterprise technology transformation. This form of contract with clear rights and responsibilities not only stimulates the enthusiasm of enterprises to participate in teaching in depth, but also effectively improves the quality of personnel training in Vocational colleges, and truly enables enterprises to achieve accurate matching of risks and benefits. The second is to promote the implementation of the pilot work of “comprehensive insurance for the integration of industry and education”, aiming at providing security for enterprises to carry out the integration of industry and education. In view of the core risks in school-enterprise cooperation, such as abnormal loss of equipment, intellectual property disputes and other issues, it provides solutions for enterprises. The government should implement a graded subsidy policy according to the local financial situation, with the proportion of subsidies ranging from 30% to 60%. For small and medium-sized enterprises actively participating in vocational education, the government will provide an additional 10% premium subsidy to reduce the risk of enterprises participating in cooperation. In addition, a linkage mechanism between insurance claims and risk prevention and control will be established, and premium return incentives will be given to enterprises without compensation records within one year, so as to encourage enterprises to strengthen risk control.

the priority of market access. For enterprises deeply involved in the integration of industry and education, priority should be given to the list of government procurement suppliers, and green credit line support should be provided. Implementing the rule of “giving priority to winning bids under the same conditions” not only guarantees the fairness of the market, but also highlights the orientation of social responsibility. Enterprises are encouraged to participate in curriculum construction with intangible assets such as technical standards and patents, and tax relief is given according to a certain proportion of the income from the transformation of achievements. Enterprises leading the development of cutting-edge technology courses (such as artificial intelligence, new energy technology) are given priority to the qualification of their products to be included in the government procurement catalogue. The second is to set up a “market expansion fund for the integration of industry and education”. Special loan discounts are provided to enterprises that have achieved technological upgrading and successfully opened up new markets through school-enterprise cooperation. In view of the resource shortage of small and medium-sized enterprises, we should learn from international experience to improve special support policies, such as Singapore’s “Skills Development Fund”, which allows enterprises to apply for up to 70% of the cost of staff training and include it in ESG reports; Japan stipulates that enterprises and vocational colleges can enjoy 150% of the excess deduction of enterprise income tax for the cost of building laboratories.

we should implement dual-subject collaborative governance to improve the participation and decision-making power of enterprises in the integration of industry and education. It requires that the proportion of enterprise representative seats in organizations such as industry-education consortia and industrial colleges should not be less than 40%, and that enterprises should be given the right to vote on major issues such as specialty setting, curriculum development and fund use. For example, higher

vocational colleges can work together with enterprises to build characteristic secondary colleges and professional groups to form a benign operation mechanism of deep integration of schools and enterprises, synchronization and coordination of professional construction and industrial development. The second is to establish a joint decision-making meeting system between schools and enterprises, and regularly discuss the direction of personnel training programs or technology research and development, so as to ensure that enterprises are deeply involved in the core links of education and teaching. The achievements of technological innovation and talent reserve achieved by enterprises through industry-education cooperation are included in ESG scores, which are linked to government project declaration and industry qualification recognition. Enterprises with high ESG scores should be given preferential resources in industry exhibitions and market promotion to achieve a win-win situation of social responsibility and commercial interests.

References

- Duan, M. (2021). Property Rights Dilemma and Countermeasures of School-enterprise Cooperation in Running Schools under the Background of Mixed Ownership Reform. *Education and Occupation*, 2021(22), 27-34.
- Gu, R. J., & Wang, H. J. (2023). Integration of Industry and Education in Vocational Colleges from the Perspective of Skilled Society: Basic Logic and Practical Path. *Educational Academic Monthly*, 2023(7), 53-59.
- Guo, F. C., & Xu, J. Y. (2025). Dynamic Mechanism and Practical Approach of Digital Transformation of Vocational Education from the Perspective of New Quality Productivity. *China Vocational and Technical Education*, (01), 105-112.
- Liu, P. C., & Liu, H. P. (2024). Internal Logic, Theoretical Dilemma and Governance Model of Integration of Industry and Education in Vocational Education from the Perspective of Community. *Vocational and Technical Education*, 45(34), 42-48.
- LIU, X. Q., & DENG, J. (2024). Reflections on the integration of industry and education from education power. *Journal of Education of Renmin University of China*, (01), 11-16+181.
- Member of the 20th CPC Central Committee, Secretary of the Party Group of the Ministry of Education, Minister Huai Jinpeng. (2025). *In-depth Study and Implementation of the Spirit of the National Education Conference Creating a New Situation of Building a Strong Educational Country* (2025-03-28) [2025-06-02]. Retrieved from http://www.moe.gov.cn/jyb_xwfb/moe_176/202503/t20250329_1185338.html
- Pan, H. S., & Li, Y. (2023). From Concept to Action: Connotation Evolution, Change Motive Force and Path Selection of Industry-Education Integration in Vocational Education in China. *Higher Education Research*, 44(04), 43-52.

- State Council. (2019). *Notice of the State Council on Issuing the Implementation Plan of National Vocational Education Reform* (GF[2019]No. 4)[EB/OL]. (2019-02-13)[2025-06-02]. Retrieved from https://www.gov.cn/zhengce/content/2019-02/13/content_5365341.htm
- The Central Committee of the Communist Party of China and the State Council. (2025). *Outline of the Plan for Building a Strong Education Country (2024-2035)*. [EB/OL]. (2025-01-19)[2025-06-01]. Retrieved from https://www.gov.cn/zhengce/202501/content_6999913.htm
- Wang, H. M., & Li, H. W. (2019). From School-Enterprise Cooperation to Industry-Education Integration:Dilemma and Solution. *Journal of Xinyu University*, 2019(2), 123-128.
- Xing, H., Cao, R. P., & Dai, Q. P. (2022). Investigation and Suggestions on the Current Situation of Industrial Colleges in Higher Vocational Colleges. *Journal of National Institute of Educational Administration*, (09), 20-29.