

Research on the Path and Mechanism of Integration of Industry and Education in Personnel Training

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Abstract—Strengthen the integration of industry and education, keep close to industrial demand in personnel training and scientific research, take all kinds of characteristic talents needed by industry as professional training standards, take various problems in industrial development as professional research subjects, and obtain more school-running resources to meet industrial demand, so as to continuously improve academic level, better serve industrial development, and form a benign development situation. Based on the analysis of the significance of the integration of industry and education and the problems existing in the implementation of the integration of industry and education, this paper explores the related issues of the deep integration of industry and education. Introduce real enterprise projects into teaching, students participate in the design, operation and other aspects of the project. In the process of graduation design and thesis writing, students practice in enterprises, and form the path and mechanism of close cooperation between universities and enterprises to train talents.

Keywords—Integration of industry and education, Talent training, Path and mechanism

I. INTRODUCTION

At present, the number of college graduates in China is increasing year by year, and the scale of higher education is the first in the world, which provides a strong human capital guarantee for economic construction [1]. Obtaining high-quality talents that meet the needs of modern enterprises has become the goal that enterprises are competing for. But at the same time, the supply side of talent cultivation and the demand side of industry are not fully adapted to the structure, quality and level, and the "two skins" problem still exists [2].

On the one hand, the difficulty of employment and the low quality of employment of university graduates have aroused the common concern of the whole society; on the other hand, many enterprises are difficult to recruit the application-oriented talents who are in short supply of suitable production services [3,4]. The main reason for this dislocation lies in the prominent structural contradiction and serious homogeneity of higher education, that is, the structure and quality of talent training in Colleges and universities can not meet the requirements of economic structure and industrial upgrading, and the ability to serve economic and social development needs to be improved [5].

Reforming the training mode of professional talents, implementing the deep integration of Industry and education, and collaborative education between schools and enterprises are in line with the train of thought and the direction of reform and development of higher education in China [6]. Deepening the integration of industry and education and promoting the organic connection of education chain, talent chain, industry chain and innovation chain are the urgent requirements of promoting the structural reform of human resources supply side [7]. It is of great significance to comprehensively improve the quality of education, expand employment and entrepreneurship, promote economic transformation and upgrading, and foster new momentum of economic development under the new situation.

II. THE SIGNIFICANCE OF IMPLEMENTING THE INTEGRATION OF INDUSTRY AND EDUCATION

(1) Implementing the integration of industry and education is an important measure to promote the structural reform of talent and human resources supply side. At present, efforts should be made to speed up the construction of an industrial system with coordinated development of real economy, scientific and technological innovation, modern finance and human resources. The key is to regard talents as the first resource to support development. Innovation drive is essentially talent drive. Human resource training and development is an important part of supply-side structural reform. At present, the educational supply of talents and the industrial demand are not fully adapted to the structure, quality and level. Especially, with the decline of the population of new working age, the structural contradiction between the supply and demand of talents is highlighted. It can be said that deepening the integration of industry and education is a very urgent task to promote the structural reform of talent and human resources supply side [8].

(2) Deepening the integration of industry and education is an inevitable requirement to adapt to the trend of leading a new round of scientific and technological revolution and industrial change. China's economic development has entered a new normal. The deep integration of industrialization and informatization has brought about vigorous development of new

industries, new technologies and new models. In particular, the innovative and practical needs of the development of robotics industry are increasingly penetrating into all aspects of personnel training [9]. It is urgent for schools to open doors, innovative education training mode, organizational form and service supply, to extend the educational content to society, and to accelerate the collaborative education between schools and enterprises.

(3) Deepening the integration of industry and education is in line with the direction of higher education reform and development. Our country is in the critical period of building a modern education system. Modern vocational education is accelerating its development. Higher education is moving from popularization to popularization. Improving quality has become the central theme of educational development, which must be driven by deepening reform. Deepening the integration of industry and education means promoting the reform of separation of management from management and "releasing control clothes", speeding up the transformation of educational governance mode, introducing enterprises and other subjects to participate in running schools, actively playing the role of trade associations and the third party of society, promoting diversification of school-running subjects and modernization of governance structure, and improving the quality of education in deepening the reform of school-running system. Deepening the integration of industry and education at different levels and promoting quality improvement through structural adjustment have become the consensus of Applied Undergraduate Universities and high-level universities [10].

III. PROBLEMS EXISTING IN THE IMPLEMENTATION OF INTEGRATION OF INDUSTRY AND EDUCATION

A. *The Internal Drive of Enterprises is not Strong*

Enterprises are facing fierce market competition and have a sense of urgency for survival. Therefore, the idea of impetuosity and eagerness for quick success and instant benefit is more serious. Some enterprises believe that cooperation with universities will invisibly increase the operating costs of enterprises, and enterprises can hardly bear the safety risks of students' internship. In this context, school-enterprise cooperation is mostly in the form, lacking long-term security and planning, and lacking of sustainable development. Some local small and medium-sized enterprises have not formed the consciousness of taking the initiative to assume social responsibility. Many small and medium-sized enterprises pursue short-term benefits, do not have the consciousness of independent innovation and brand building, and their long-term strategic planning objectives are not clear. Enterprises are reluctant to carry out school-enterprise cooperation because of safety production considerations. Some enterprises can not understand the necessity and importance of integration of industry and education and cooperation between schools and enterprises from a strategic perspective, and lack their understanding of the strategic significance of enterprise's long-term talent reserve. They believe that with the popularization of higher education, the number of college graduates increases, and enterprises have more initiative and choice in recruitment. In addition, in some local colleges and universities, teachers are not strong, technical support is limited, and students' quality needs to be improved. It fails to enable enterprises to get practical and effective help in the integration of Industry and education, school-enterprise cooperation, and also affects the enthusiasm of enterprises, resulting in unstable, non-standard and unsustainable school-enterprise cooperation.

B. *Institutions of Higher Learning have their own Shortcomings*

Firstly, the professional settings of schools are not symmetrical with the regional industrial structure. In some local colleges and universities, when they add new majors, they do not really conduct in-depth social research, adjust their specialty settings according to the market demand for talents and the current situation of regional economic development, or even blindly follow the trend and pursue the so-called popular specialties. The specialty settings lack the characteristics of the University and can not well promote regional economic development. Secondly, talent training and enterprise demand are not symmetrical. In the process of promoting school-enterprise cooperation, many local colleges and universities tend to focus on their own teaching plans and internship arrangements, with less consideration of the specific situation of the cooperative enterprises, which makes the conflict between the two sides in terms of time and personnel arrangements, and ultimately affects the stability of cooperation between the two sides. Thirdly, the arrangement of curriculum content in Colleges and universities does not meet the requirements of Vocational standards, and the proportion distribution of theoretical knowledge and practical content in the teaching process can not meet the needs of the actual production process of enterprises. Finally, the unreasonable structure of teachers in some colleges and universities and the fact that most of the introduced teachers are graduates who lack practical experience hinder the further development of the integration of industry and education.

C. *Lack of Policy and Institutional Guarantees*

Our country attaches great importance to personnel training, and also advocates speeding up the integration of Industry and education and strengthening school-enterprise cooperation. However, the relevant rules and regulations are imperfect, and the investment of funds is insufficient. The support for cooperation between schools and enterprises needs to be strengthened. In the cooperation between school and enterprise, the division of related rights and responsibilities is not clear. Once problems occur in the cooperation, we don't know who should bear the responsibility, which leads to the gradual loss of enterprise cooperation enthusiasm. The lack of practical policy drivers and legal guarantees in school-enterprise cooperation between enterprises and universities has left both sides at a lower level in terms of depth and breadth of cooperation, which needs to be strengthened. Secondly, the integration of industry and education, school-enterprise cooperation can not be separated from the government's financial support and preferential policy support, but at present, the government departments in the formulation of incentive policies, mobilize the enthusiasm of school-enterprise cooperation, and promote the transformation and development of local ordinary undergraduate colleges and universities need to be further strengthened.

D. Integration of Industry and Education is a Mere Formality

A series of activities, such as school-enterprise cooperation, specialty construction, student training, internship and employment, are carried out around the training base of integration of industry and education, aiming only at the scattered elements of education, lacking the platform thinking of integrating resources of industry, universities and enterprises, and failing to realize the real integration of industry and education. Some schools have set up many professional courses, but the curriculum is out of touch with social development. The professional settings are not suited to the needs of enterprise development, and the corresponding employment rate is poor. The orientation of school-enterprise cooperation personnel training objectives is not clear, and there is no talent training plan and long-term cooperation mechanism. Some teachers have very rich theoretical knowledge, but their practical experience needs to be improved. These factors will affect the cooperation between enterprises and schools.

IV. THE WAY TO IMPLEMENT THE INTEGRATION OF INDUSTRY AND EDUCATION

A. Constructing the Implementation Path of the Integration of Introducing Enterprises into Schools, Introducing Enterprises into Schools and Enterprises

With the path of "introducing enterprises into schools, introducing schools into enterprises and integrating schools into enterprises", we should build a platform for cooperation between schools and enterprises to educate people, and innovate the training mode. To make different social division of labor coordinate in the aspects of function and resource advantages, such as scientific research, teaching, production and other fields, so as to realize the docking and coupling of technological innovation at different levels and depths. Enterprises and schools should build and share productive training bases, jointly design training programs, undertake teaching and practical tasks, and form a sustainable development mechanism of "platform co-construction, resource sharing and achievement sharing".

B. Strengthen the Link of Practice Teaching and Strengthen the Construction of Practice Training Bases Inside and Outside Schools

Taking the road of "integration of industry and education" and "interaction between schools and enterprises", cultivating high-level compound applied talents based on ability and oriented by social needs is the most core and effective way. School-enterprise cooperation is an important channel for training students' practical ability and applied talents. It provides a practical platform for training applied and skilled engineers, shortens the adaptation period of students from school to enterprise, speeds up the transformation of students' roles from students to technicians, and meets the training needs of enterprises for talents. Construct a practical teaching system for engineering and technical personnel who can quickly meet the needs of the development of the robotics industry and be competent for jobs and innovative, strengthen the links with enterprises or industries, focus on training students' engineering practical ability, and build a diversified practical teaching system on the platform of school-enterprise cooperation. Practice teaching is arranged according to the interrelated stages of "cognition, individual skills, comprehensive simulation, enterprise post, project practice".

C. Renewing the Concept of Government, Enterprise and School, Promoting the Deep Implementation of the Integration of Industry and Education

The government should take more measures to implement it. Local governments should recognize the role of integration of industry and education and cooperation between schools and enterprises in the coordinated development of local universities and local economy from the perspective of overall regional development, plan the development layout of local universities and local enterprises as a whole, and enhance the ability of local universities to serve regional economic development.

Institutions of higher learning should strengthen internal work and fully dock. Colleges and universities should enhance their ability to serve economic and social development according to the development trend of local industrial adjustment and transformation and upgrading. The design of curriculum content should meet the needs of professional standards. Before the course design, we should carry out market research, industry analysis, expert discussion and other multi-angle, all-round demonstration, and make comprehensive determination based on professional training objectives and professional standards. The teaching content of the integration of industry and education should be updated and adjusted in time to ensure the practicability and novelty of the teaching content. The teaching process is connected with the production process. In order to deepen the integration of industry and education, project-driven and task-driven teaching methods can be used to incorporate production process post tasks, stimulate students' interest, enrich teaching content, and enhance students' learning of professional production knowledge and skills through experiential training.

Enterprises should raise awareness and actively participate. Enterprises should not only view school-enterprise cooperation from the perspective of advantageous to the development of enterprises themselves, but also from the perspective of national interests, and do a good job in the integration of industry and education and the participation of school-enterprise cooperation from the macro, meso and micro levels. Only in this way can we achieve win-win cooperation and sustainable development.

V. MECHANISMS AND PROGRAMMES FOR THE IMPLEMENTATION OF INTEGRATION OF INDUSTRY AND EDUCATION

At present, the talent hierarchy has been transformed and upgraded. The industrial enterprises need a large number of compound and applied technical talents, which urges our talent training model to be updated and adjusted accordingly.

A. Implementing the In-depth Integration of Industry and Education and Improving the Operational Mechanism of School-enterprise Collaborative Education

Deep integration of Industry and education will achieve a good situation of talent co-cultivation, process co-management, responsibility co-sharing and achievement sharing. Enterprise technical standards, process standards, training standards and management standards will be fully integrated into the whole process of training Robotic Engineering professionals, so as to realize the docking of professional construction and industrial needs, curriculum content and professional standards, teaching process and production process. As shown in Fig. 2, the Joint Laboratory of school and enterprise ("school factory") will be built in the school laboratory, and the engineering teaching and training base ("factory school") will be set up with enterprises relying on industry benchmarking enterprises. As shown in Fig. 3, schools and enterprises play their respective advantages in jointly developing personnel training, building production-learning-research platforms, and building a "double-qualified teaching team". They operate in the form of contract constraints to achieve deep integration of industry and education, and cooperate with schools and enterprises in educating and cooperating development, so as to promote the integration of schools and enterprises to cultivate compound applied talents.

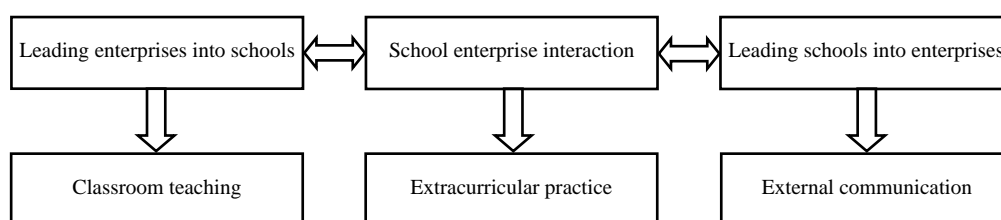


Fig. 1. Integration mechanism of industry and education

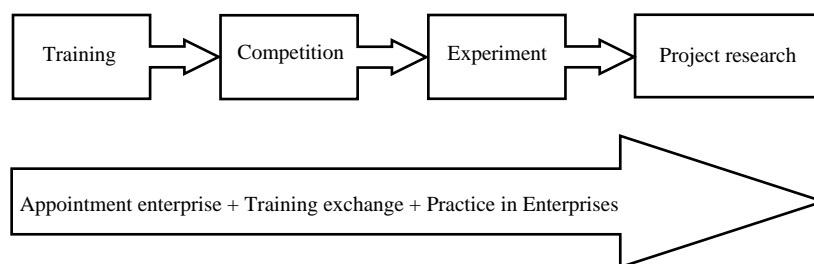


Fig. 2. Construction of team of double teachers

B. Implementing the Deep Integration of Industry and Education, Strengthening the Joint Efforts of Professional Education and Innovation and Entrepreneurship, and Creating the Training Mode of Characteristic Talents

Innovation and entrepreneurship personnel training can not be separated from knowledge and professional education. We should have a deep understanding of the frontier areas of industrial development needs, follow the principle of integration of industry and education, improve the dynamic adjustment mechanism of specialty, combine industry and enterprise resources vertically and horizontally, and give full play to enterprise personnel training standards, specialty settings, Curriculum development, product development, teacher training and transformation of scientific research results. And the enthusiasm of students in practice and employment, to promote the substantive participation of enterprises in the whole process of personnel training. Strengthen the construction of characteristic specialties, integrate them into the industrial chain in an all-round way and in depth, and focus on the construction of specialties closely related to the characteristics of local industries, so as to form a characteristic specialty system that can meet the needs of industrial transformation and upgrading, and highlight the characteristics of the industry, and highlight the training mode of advanced and composite innovative applied talents.

C. Implementing the Deep Integration of Industry and Education, Constructing the Theoretical Framework of Compound Application-oriented Ability Training, Orienting Innovation and Entrepreneurship Education to all Students and Integrating it into the whole Process of Talent Training

Firstly, we should strengthen the construction of curriculum system of innovation and entrepreneurship education, effectively incorporate innovation and entrepreneurship education into the teaching plan and credit system of professional education and cultural quality education, establish a multi-level and three-dimensional curriculum system of innovation and entrepreneurship education for related courses, and set up a series of courses of innovation and entrepreneurship education such as "entrepreneurship" and "creative engineering" to broaden students' knowledge. To enhance students' innovative consciousness and humanistic quality. Secondly, we should strengthen the construction of double-qualified teachers, guide professional teachers and business mentors to cooperate in the development of courses and practical cases, actively recruit entrepreneurs, experts and scholars from all walks of life as part-time teachers, and establish a high-quality double-qualified

teachers team with full-time and part-time integration. Thirdly, based on the deep integration of industry and education, school-enterprise collaborative education as an important extension of the cultivation of compound applied talents, through organizing innovative entrepreneurship competitions, lectures, forums, simulation practice and other ways, enrich students' innovative entrepreneurial knowledge and experience, and enhance students' innovative spirit and entrepreneurial ability.

D. Implementing the Deep Integration of Industry and Education to Build a Bridge Between Theory and Practice

Through the deep integration of Industry and education, the teaching mode of "classroom workshop and workshop classroom" is implemented, and the bridge between theory and practice is erected. "Classroom workshop" requires actively creating an atmosphere of working scenes in classroom teaching. In the process of teaching, the curriculum module is set up on the premise of skill requirement, and the professional theory is understood on the basis of material object or model operation; "workshop classroom" enables students to realize the unity and integration of knowledge and skills, process and method, emotional attitude and value learning through overall learning and Reflection on the task, process and environment of technical work in enterprise practice.

VI. CONCLUSION

"Relying on industry to run specialties and running professional service industry well" is a school idea that should be adhered to in the integration of Industry and education in higher education. In-depth cooperation between schools and enterprises, real projects of enterprises are brought into teaching, and students participate in the design and operation of projects. In the process of graduation design and thesis writing, a mechanism of close cooperation between universities and enterprises is formed. Create a real workplace environment in the way of "studio" and "innovation training room", that is, business incubator, so that students can directly participate in all aspects of the operation of enterprises, and can directly contact the operation mode, technology and latest technological developments of relevant industries. Deep integration of industry and education aims at cultivating high-quality talents, and strives to highlight the "four combinations" in the talent training model: the combination of curriculum knowledge and industrial practical knowledge, the combination of professional teaching and general teaching, the combination of professional education and innovation and entrepreneurship education, the combination of value guidance and ability training, so as to establish a talent training model that meets the needs of the times and highlights its characteristics.

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