

Exploration and Practice of the Integration of Industry and Education Enabling the High-quality Development of Local Universities

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Abstract: Local universities are an important part of Chinese higher education. Facing the new requirements of future industrial transformation, regional development strategy and characteristic development of universities, local universities must deepen the cooperation between universities and enterprises, build a community of industry-education integration and development, and promote the high-quality development of universities. With the publication of "Several Opinions on Deepening the Integration of Industry and Education", the research on the integration of industry and education has attracted much attention and become the consensus of all circles, but there are still many difficulties in the process of reality. As a university with agricultural machinery characteristics, Jiangsu University insists on facing industry development and regional economic and social development, continuously deepens the integration of industry and education, strives to build a training base for modern agricultural equipment talents, a research and development platform for high-end intelligent agricultural equipment, an important force for rural revitalization, and an important window for inheriting and innovating Chinese agricultural machinery culture, which provides an important reference for the high-quality development of the integration of industry and education in local universities.

Keywords: Local Universities, Integration Of Industry and Education, High-Quality Development

1. Introduction

As the main force and fresh force of Chinese higher education, local universities account for more than 95% of the total number of colleges and universities in China, bearing the historical responsibility and mission of supporting regional economic and social development and high-quality development of the industry, which is of great significance for speeding up the building of a strong socialist modernization country and achieving high-level scientific and technological self-reliance. However, local universities are generally faced with many difficulties, such as low quality of students, insufficient funds for running schools, few high-level talents and innovative platforms, limited autonomy for running schools, and insufficient policy support, which restrict the establishment of "first-class universities". At present, China's annual gross national product has exceeded 100 trillion RMB, its total economic output has leaped to the second place in the world, and its per capita GDP has exceeded 125,000 dollars, opening a new journey of building a strong socialist modernization country in an all-round way. Based on the new stage, how to deepen school-enterprise cooperation and build a community of integration of industry and education has become an important path for the high-quality development of local colleges and universities.

2. The New Situation Faced by the Development of Local Universities

2.1. Future Industrial Change Leads New Orientation

With the rapid breakthrough of major frontier technologies and disruptive technologies in the world and the accelerated layout of strategic emerging industries, as a country with the most complete industrial system in the world, China's traditional industries will accelerate transformation, upgrading and optimization of layout. Taking the agricultural machinery and equipment industry as an example, with the support of the "Guiding Opinions on Accelerating the Transformation and Upgrading of Agricultural Mechanization and Agricultural Machinery and Equipment Industry", the comprehensive mechanization

rate of crop cultivation and harvest in China has reached 71.25%, and agricultural production has entered the leading stage of mechanization in pursuit of high yield and intelligence.^[1] Agricultural machinery and equipment are changing from local demand to the demand of the whole chain of production process, such as cultivation, planting, management, collection, transportation and storage, and accelerating the transformation from low-end products to diversified, intelligent, efficient, energy-saving and environmental protection high-end products. Industrial transformation and upgrading have given birth to new technologies, new industries, new formats and new models, which promote local industry colleges and universities to find a new orientation of combining personnel training with industry needs, and focus on training more new talents for the frontier of industrial development.

2.2. Regional Development Strategy Brings New Opportunities

At present, China is accelerating the overall promotion of major regional strategies such as the revitalization of Northeast China, the development of the western region, the coordinated development of Beijing, Tianjin and Hebei, and the integrated development of the Yangtze River Delta. The regional coordinated development of higher education is not only related to the implementation of major national strategies, but also related to social equity and common prosperity. As the main supplier of high-quality human resources and the important engine of scientific and technological innovation in the region, local universities have the comparative advantages of being rooted in local areas, close to industries, focusing on innovation and gathering talents, and will play a more prominent role in regional economic and social development, and will also usher in an important period of opportunity for high-quality development.

2.3. Characteristic Development Puts Forward New Requirements

School-running characteristics are the essential core of university culture inheritance, and also the important embodiment of university spirit. As China's higher education enters the stage of popularization, local universities must adhere to the goal of "Chinese characteristics, world-class", face the main economic battlefield and the major needs of the country, give full play to the advantages of the industry and the characteristics of disciplines, establish and improve the personnel training system, scientific and technological services and transformation system closely linked to the industrial chain, and help to upgrade the industrial chain. In supporting the high-quality development of regional economy and society, we should support and promote the characteristic and leapfrog development of universities.

3. The Current Situation of the Integration of Industry and Education in Universities

3.1. Increasing Attention to Research on Integration of Industry and Education

Industry-education integration is a process in which the interests of industry, science and technology, education, learners, managers, employers and other subjects are integrated, so we must build a community of industry-education integration development from the perspective of co-construction, sharing and mutual benefit. In the early research perspective, most of them were in the fields of vocational education and higher education. With the richness of research content and the rapid development of artificial intelligence, computer software, applied economy and other fields have been gradually increased, and the research perspective tends to be more diversified. From the perspective of the number of articles published by CNKI, the number of articles published on the theme of integration of industry and education has increased year by year, with a total of 16874 articles, especially 10,254 articles directly on the theme of integration of industry and education. The date of publication of research literature on integration of industry and education in CNKI are shown in Figure 1:

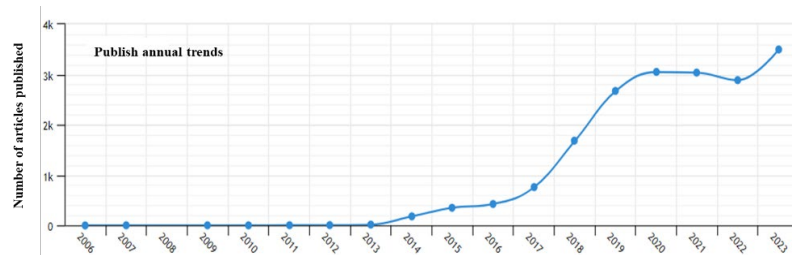


Figure 1: Publication of Research Literature on Integration of Industry and Education in CNKI.

3.2. The Integration of Industry and Education has Become the Consensus of the Participants

As a country with the most complete industrial system in the world, with the rapid development of artificial intelligence and intelligent manufacturing technology, under the guidance of the strategy of manufacturing power, China's traditional industries will accelerate transformation, upgrading and optimization of layout, and the integration of industry and education has become an important consensus of the education sector, industry and government. Historically, the system of integration of industry and education has gone through four stages: integration of industry and education, separation of industry from education, combination of industry with education, and integration of industry. It has three characteristics: policy fragmentation to policy systematization, insufficient supply to effective supply, and single subject to multiple subjects.^[2] However, from the perspective of stakeholder theory, there are some deficiencies in the implementation of the policy of integration of industry and education, the evaluation mechanism of government policy, and the docking of school specialty and local economy. In order to promote the sound development of the policy of integration of industry and education, we should build a reasonable interest mechanism and establish a standardized incentive mechanism for cooperation.^[3] In order to further deepen the integration of industry and education and promote the organic connection of education chain, talent chain, industry chain and innovation chain, China issued "Several Opinions on Deepening the Integration of Industry and Education" in 2017, which made it clear that enterprises should play an important role as the main body, promote the all-round integration of structural elements of talent training supply side and industry demand side, and improve the integration. We will accelerate the construction of an industrial system with coordinated development of real economy, scientific and technological innovation, modern finance and human resources. In 2019, the National Pilot Implementation Plan for the Integration of Industry and Education was issued. In 2023, by integrating the high-quality resources of the rail transit equipment industry, a national industry-wide and cross-regional industry-education integration community was established, which became the first government-led demonstration model of the national industry-education integration community, it provides an important reference for promoting the integration of vocational education, industry and education, and science and education.

3.3. There are Still Many Problems in Deepening the Integration of Industry and Education

The integration of industry and education can promote the professional docking of knowledge and technology, stimulate the generation of new knowledge and technology, and improve the efficiency of knowledge use in universities and industries, which is of great significance for accelerating economic and social innovation and development.^[4] Influenced by many factors, such as system and mechanism, the integration of industry and education has remained at the primary stage of low-level and shallow cooperation, and the problem of "two skins" on the supply side of personnel training and the demand side of industry still exists, failing to achieve deep-seated institutional integration, especially the cognitive deviation of multiple subjects, the weakening of the status of executive organizations, and the imperfection of incentive-leading mechanism. It has seriously affected the effectiveness of the integration of industry and education.^[5] The participants of the industry-education integration community include universities, enterprises and governments, the governance mechanism is the key to the establishment of the industry-education integration community, and is also the key to whether the community can smoothly embark on sustainable and stable governance, it is necessary to establish a scientific, rational and win-win governance system.^[6]

4. Exploration and Practice of Characteristic Development of Industry-Education Integration in Jiangsu University

Jiangsu University is the first university in China to set up agricultural machinery specialty and systematically carry out agricultural machinery education. For more than 60 years, it has persisted in facing the development of the industry and regional economic and social development, and has always taken promoting agricultural mechanization and modernization as its mission. It has trained the first batch of undergraduates, masters and doctors of agricultural machinery in China, and has been awarded many national scientific and technological achievements in the field of agricultural equipment, and has made important contributions to the training of agricultural equipment talents, scientific and technological innovation and agricultural and rural modernization in China. At present, 13 disciplines have entered the top 1% of ESI in the world, and 3 disciplines have entered the top 1‰ of ESI in the world, ranking 458th in the comprehensive ranking of ESI and the top 300 in the academic ranking of soft world universities.

4.1. Building a Training Base for Modern Agricultural Equipment Talents

In recent years, Jiangsu University improve the discipline and specialty system with agricultural engineering as the core, add 35 disciplines with agricultural characteristics and advantages, improve the joint construction mechanism of interdisciplinary disciplines and research centers, and build an ecological system of disciplines and specialties led by the establishment of first-class disciplines. Especially, Jiangsu University set up 10 academies to comprehensively implement the "college + Academy" education model and promote the sinking of educational forces into the student community, and set up a series of courses on agriculture, countryside and farmers in big countries, establish a practice base for farming and reading education, hold a cultural festival for farming and reading, and form a long-term mechanism for the integration of farming and reading education and labor education. To further promote the integration of "new agricultural science" and "new engineering science", Jiangsu University set up an experimental class for top-notch talents in Gaoliangrun New Agricultural Science, and accelerate the implementation of "Major + Micro + Minor" education and teaching reform, jointly build training bases with well-known enterprises and research institutes.

4.2. Building an Important Platform for Research and Development of High-end Intelligent Agricultural Equipment

Jiangsu University attaches great importance to strengthen the construction of high-level research platforms for agricultural equipment, establish a key laboratory for intelligent agricultural machinery theory and technology, strengthen the construction of collaborative innovation centers, digital agricultural equipment innovation sub centers, prepare for the establishment of intelligent agricultural machinery equipment testing centers, and build an innovation system that supports major national strategies. It deepened cooperation with SINOMACH, Jiangsu Academy of Agricultural Sciences, Nanjing Institute of Agricultural Mechanization, etc., jointly established the Intelligent Agricultural Equipment Research Institute with leading enterprises in Jiangsu Province, led the establishment of Jiangsu Intelligent Agricultural Machinery and Equipment Industry Alliance, undertook the national key R & D plan and major key core technology projects in Jiangsu Province, and was awarded the Jiangsu Intelligent Agricultural Machinery and Equipment Industry-Education Integration Base. In addition, Jiangsu University strengthen organized collaborative research, invest 30 million RMB annually, break through multiple key technologies in the field of modern agricultural equipment, develop high-end equipment such as unmanned combine harvesters and grape picking robots, and jointly release the world's first hybrid electric drive continuously variable speed tractor and new energy unmanned intelligent tractor. Collaborating with relevant enterprises to create high-efficiency rice wheat oil combine harvesters and low energy consumption multifunctional water-saving irrigation equipment, the developed residual film recycling combine harvester has been transformed and put into operation in Changzhou Hanmey.^[7]

4.3. Building an Important Force for Serving Rural Revitalization

Jiangsu university fully integrating into rural revitalization, built a batch of technology demonstration bases with Jurong and Yixing, and have been approved as a digital agriculture and rural base in Jiangsu Province. Jurong has become one of the first batch of "National Leading Counties for Agricultural Science and Technology Modernization" in China, and the modern agriculture smart demonstration base jointly built with Yixing has successfully passed the acceptance inspection and has been included in the excellent achievements of digital agriculture and rural new technology promotion. On the other hand, Jiangsu University has also successively strengthened the construction of agricultural equipment think tanks, established the China Agricultural Equipment Industry Development Research Institute, the Common Prosperity Research Institute, and the Jiangsu Rural Revitalization Research Institute, developed agricultural mechanization industry standards such as the "Technical Specification for Mechanized Transformation of Farmland in Hilly and Mountainous Areas", and released the "Roadmap for the Development of Agricultural Machinery Equipment Industry and Technology". The governance report won the first prize for outstanding achievements.

4.4. Building an Important Window for Inheriting and Innovating Chinese Agricultural Machinery Culture

Jiangsu university invested a lot of resources to build the China Agricultural Machinery Culture Exhibition Hall, upgrading and renovation of the school history hall, construction of the agricultural equipment literature resource center with high standards, and the China Agricultural Machinery Culture

Exhibition Hall being awarded the Jiangsu Province Science Popularization Education Base. Deeply cooperating with international organizations such as the United Nations Industrial Development Organization and the Asia Pacific Economic and Social Council, it has been approved to establish a global agricultural modernization and food safety education and training center. The "the Belt and Road" International Intelligent Agricultural Machinery Equipment Science and Technology Innovation Institute was established, led to launch the International Alliance of Agricultural Engineering Universities and the International (Capacity) Cooperation Alliance of Agricultural Machinery Equipment, and was awarded the Innovation and Talent Introduction Base. The audience of Zambia's international agricultural machinery training project has expanded to many African countries. The "Leisi International Conference" founded by Zambia has become an important brand of agricultural foreign cooperation. The "the Belt and Road" Forum for International Cooperation and Development of Agricultural Modernization has been listed as a typical project of China International Education Exchange Association.

5. Conclusions

Facing the future, local universities should firmly grasp the opportunity of the era of integration of industry and education, closely meet the development needs of industrial clusters, and build a high-level talent training system and a scientific and technological innovation system that are organically linked and mutually supportive through the collaborative integration and innovation of disciplines and the expansion and extension of industrial chains, so as to promote the sustainable and high-quality connotative development of universities.

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