

Construction of the Integration Model of Production and Education in Colleges and Universities Based on Triple Helix Model

Nini Zhang^{1,2}

limaolin22@163.com

Guangzhou Vocational College of Technology & Business, Guangzhou 511442, China¹
University of Perpetual Help System DALTA, Las Pinas City 1740, Philippines²

Abstract. In recent years, domestic educational scholars have put forward various modes of integration of production and education to adapt to the development of contemporary vocational education, but some modes still have some problems such as unclear roles and tasks. In order to better integrate production with education in geography and give full play to various factors, this paper analyzes the roles of government, enterprises and schools in the process of integration of production with education. In this paper, the triple helix model is adopted, starting from two aspects of economic interests and social responsibilities, and it is proposed that enterprises' demand for popularization and application, talent, goodwill, industry-university cooperation and exchange, technology development and economic interests should be connected with the cultivation of students' engineering practice ability, customized training of students, discipline competition, curriculum teaching reform, scientific research cooperation and service for economic and social development, respectively. The strategies for the integration of production and education of different types of enterprises are given, so as to provide better for all parties involved in the integration of production and education in higher vocational colleges.

Keywords: Integration of production and education; triple helix model; enterprise; school

1. Introduction

Over the past 40 years since the reform and opening up, China's education system has provided many technical support for the development of the economy and society, and has trained many talents. focusing on production, management and public service. The integration of business and education is a must through the development of the economy and the business community for learning to work in the changing economy. This, strong support for the development of vocational education and the development of business and technology, scientific and pragmatic education to move to vocational education to keep up with the times, elements key words and ways to ensure the construction of modern vocational education, and the direction of development that China's vocational education should follow in the long term. Triple helix theory is the mainstream model to analyze the relationship among universities, enterprises and government. This model was put forward in 1995 by American sociologist Henry Ekkowitz and Dutch scholar Lauette Reddes-dorf. The core value of this theory lies in breaking the traditional organizational boundaries and functional divisions among universities,

enterprises and the government, so that each role shows the functions of the other two roles, but at the same time it still retains its traditional role and identity [1-2].

2. Research method

2.1. Triple helix

The triple helix model has evolved from the double helix model that describes DNA structure. Double helix refers to a structural model that can maintain stability in a complementary manner in the environment, as shown in Figure 1. The triple helix not only contains the complementary effect of double helix, but also involves complex transformation processes, which were first applied in crystallography and molecular biology research. Universities are not blindly producing knowledge, and industries and governments are not passively accepting knowledge. The scientific research activities of universities, governments, and industries are becoming increasingly complex, and knowledge production is intertwined. The starting point and direction are not single, and they have the characteristics of multi subject participation and cooperation. In the three spiral model of technological innovation, universities, governments, and industries are interconnected and interact with each other, exchanging resources and knowledge simultaneously. The three spirals promote each other's improvement through interaction and jointly contribute to technological innovation. In an ideal triple helix, each helix has relatively independent parts, as well as interconnected and interdependent parts, exhibiting dynamic characteristics of vertical evolution and horizontal circulation. E represents the total energy of technological innovation, while E_g , E_u , and E_i represent the respective energies of the government, universities, and industry. Energy synthesis can be expressed as:

$$E = f(E_g, E_u, E_i) \quad (1)$$

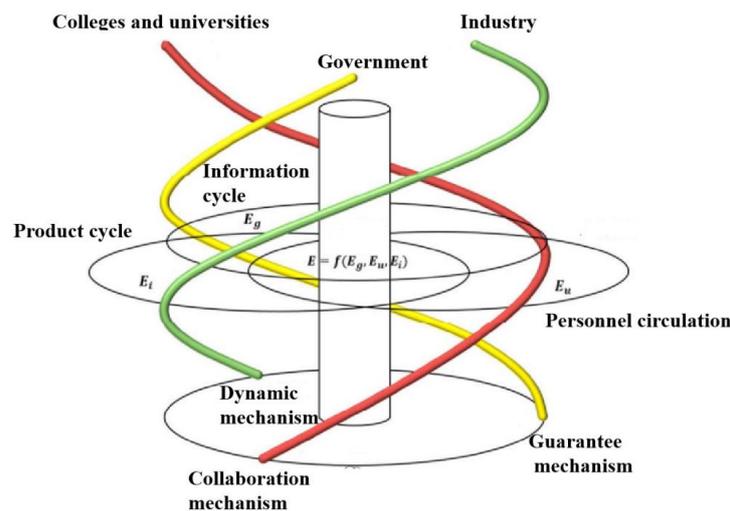


Fig 1. Government University Industry Science and Technology Innovation Triple Helix Model

The three spirals of technological innovation are composed of three independent spirals: government, universities, and industry. Each spiral extends upwards according to its own activities, and the government's management activities provide a guarantee mechanism for the three spiral model; University research activities provide a collaborative mechanism for the three helix model; The operational activities of the industry provide a driving mechanism for the triple helix model. At the same time, in the horizontal dimension, the three spirals interact with each other to achieve cross platform circulation of personnel, information, and products, and work together to promote the generation of innovative results. The interaction among the three is manifested in: universities actively meet social needs by applying for funding projects, and liaise with the government; The government links with the industry by issuing preferential policies and proposing product supply demands; The industry connects with universities by participating in collaborative research projects and jointly building research centers. Relying on the hierarchical coupling of fund projects, emerging markets, and collaborative research, we continuously promote technological innovation.

2.2. Based on the "triple helix" theory, the construction of the integration model of production and education

The integration of business and education is the deepening of academic work and business, and the deepening of cooperation between universities and business enterprises in order to develop their training skills. At this stage, due to various reasons, the government, schools and business are isolated from each other in the development of vocational education, and have not formed a unified force, which is far of the country's need for the integration of business and education in vocational education. The "triple helix" concept is an important model for analyzing the relationship between government, business and school, and an important model for analyzing the process of the combination of production and education in higher vocational colleges. This model can effectively connect the government, business and school, create "concern", and connect them together around the theme of cultivating talent, creating mutual interaction between government, business and school. The triple spiral relationship of interaction and spiral up, our participation and care for each other in the process of integration of business and education, and share their roles in the integration of business and education. The theoretical model of "triple helix" is shown in Figure 2.

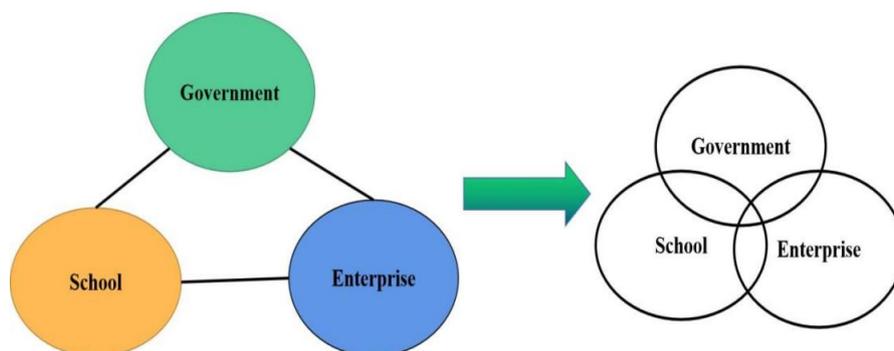


Fig 2. Theoretical model of "triple helix"

(A) the role of the government in the "triple helix" theoretical model

In the "triple helix" theoretical model, the government plays the role of top design and guidance. In the administrative management of vocational education in China, the Ministry of Education is responsible for the overall planning and the local government manages it directly. Therefore, the development of vocational education should be under the guidance and supervision of the national education management organization and the government at all levels. In addition, in the context of economic change and development, both schools and businesses will avoid the situation where the government's policies are not clear or clear. Therefore, the top-level design policy is an important guarantee for the integration of school, business, industry and education, the basis of the power of the economy. copy, and the basis and recognition for the use of the integration of business and education by institutions[3-4].

(B) the role of enterprises in the "triple helix" theoretical model

In the theoretical model of the "triple helix", businesses are the main body of the integration of business and education, the leader of government policies, and the main carriers to try and promote skills training in schools. The General Office of the State Council has published several proposals on the Research Cooperation between Business and Education. higher education according to the law, based on transparent admissions and reducing the approval rate. Academic work cannot run without the cooperation of business. Academic leadership, school leadership, and classroom leadership are traditional ways to improve the quality of professional learning. As early as 2006, the Recommendation on Strengthening the Work of Professionals issued by the General Office of the State Council pointed out that "leading the economic print to be the main body, we must open many ways to develop advanced skills". It can be seen that businesses play an important role in vocational education. As the stakeholders of the integration of business and education, businesses should participate in the technical training process of vocational education in the whole process [5].

(C) the role of schools in the theoretical model of "triple helix"

In the "triple helix" theoretical model, schools are "social" products. of cultivating new skills in the integration of business and education. In the integration of business and education, the university should actively explore the process of technical training with the government and companies, dedicated and working for the business community energy and business policy, open the school, close to the market, and actively share business ideas and business resources to participate in the whole process of training teaching skills. In the introduction of the Guidelines on the Promotion of the Integration of Secondary Education and Higher Work, the Ministry of Education requested that modern vocational education should be based on the views get on the development in business and social and complete "five docking" with the development of business and social, that is, docking between students and business, docking between learning content and work standards, docking of teaching methods and production methods, and docking of educational certificates and professional certificates, The school should take "five docking" as the beginning, and strive to do a good job of deep connection with business and industry.

3. Analysis of the interests and needs of the integration of production and education

3.1. The dynamic factors affecting the integration of production and education

According to the triple helix model, the three subjects ("organisms") of the government, universities and enterprises have their own "genes". For example, the three functions of universities' talent cultivation, scientific research and serving the society are their inherent genes, so the government, universities and enterprises are independent of each other. But at the same time, they are also affected by their "environment", namely, economic interests, social responsibility and industry market, etc. Any change in one of these factors will affect the other two factors, so they must cooperate closely and interact with each other. External forces for enterprises involved in the integration of production and education mainly come from the government, universities and the macro environment [6]. The macro environment includes the management environment, the business environment, the environment and science and technology. The regulatory environment generally refers to factors such as laws and regulations that have a real and potential impact on business participation in business integration. and education; The business environment refers to the business environment in which the business is located; The environment refers to the cultural culture, values, culture and other regulations that affect businesses involved in the integration of business and education; Science and technology environment refers to the development of the country's science and technology. The interests of enterprises participating in the integration of industry and education can be classified into two categories: economic interests and social responsibilities. Its dynamic factors mainly include the driving force of self-interest pursuit, enterprise value recognition and pursuit, external interest stimulation, binding force of laws, regulations and informal norms, etc., as shown in Table 1.

Table 1. Dynamic factors for enterprises to participate in the integration of production and education

	profit drive	External power	Internal power
profit demand			
economic interest		External interest stimulating force	Self-interest driving force
social responsibility		Binding force of laws and regulations and informal norms	Enterprise value identification and pursuit

3.2. Integration of production and education benefits and demand docking

According to the "triple helix" theory, the core value of the triple helix model lies in the integration of universities, governments and enterprises with different value systems and functions, and the unity of knowledge field (universities), administrative field (government) and industrial field (enterprises) through the cooperation of government, industry and university, thus promoting the symbiosis and win-win between universities, governments and enterprises. An important basis for creating this resultant force lies in breaking the traditional boundaries, including discipline boundaries, industry boundaries, regional boundaries, concept

boundaries, etc., and establishing the interest-demand docking strategy based on economic interests and corporate responsibilities on the cross boundary section, as shown in Figure 3. Balance the interests of key stakeholders by matching interests and needs, so as to promote the development of industry-university cooperation [7-9].

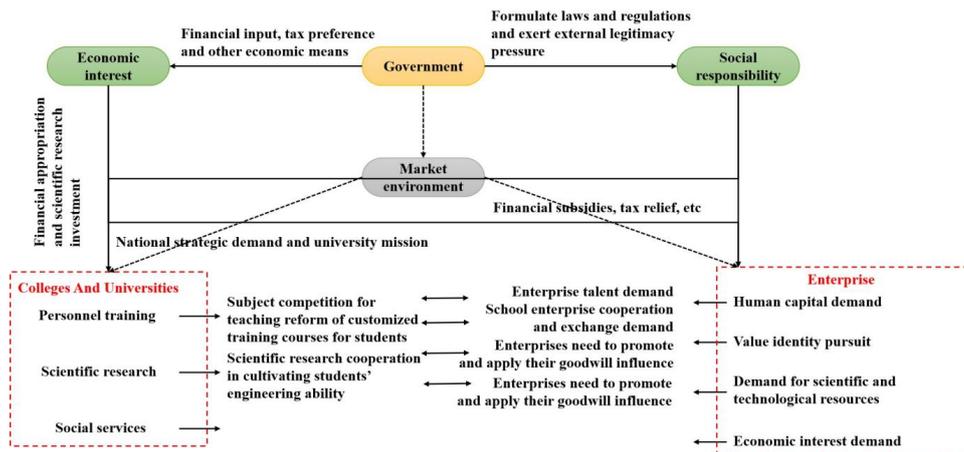


Fig 3. Demand Docking of Industry-Education Integration Based on Triple Helix Model

4. The "triple spiral" relationship between government, enterprise and school in the integration of production and education.

In the strategic process of promoting the integration of business and education, the government, companies and schools all have their rights, responsibilities and obligations. However, from the four latitudes of "internal evolution of spirals, mutual influence among spirals, coverage of new trilateral network, organization generated from the interaction of three spirals, and regression effect of triple spiral network", which constitute the triple spiral model theory, the three are not going their own way, nor are they simply pairwise relations, but one of them. In the regional innovation system, the internal functions of the three are constantly evolving, and they are intertwined and interact with each other, forming a continuous and close strategic partnership, jointly promoting the production, transformation, application and upgrading of knowledge, jointly realizing the effective connection between professional chain and industrial chain, and jointly promoting the coordinated development of regional education, economy and society [10-11].

5. Conclusion

In the "triple helix" theoretical model, the government, enterprises and schools bear different rights and obligations. Its core idea is to establish a cooperative system between schools and enterprises under the guidance of the government, and to form a complete operation

mechanism of integration of production and education, so as to jointly cultivate high-quality skilled talents for the country and society.

Acknowledgments. The 2022 Education Science program of Guangdong Province: A narrative study on the growth of dual-qualified foreign language teachers in higher vocational colleges based on the integration of industry and education. Fund number: 2022GXJK573

References

- [1] Liao, X. , Fu, Z. , Huang, Z. , Li, Z. , & Li, X. . (2021). Exploration and practice of "integration of production and education, integration of science and education and integration of theory and practice" in medical talent training. *Advances in Applied Sociology*, 11(6), 308-314.
- [2] Li, H. , Ao, Y. , & Yu, T. . (2020). Research on the Governance Path Reform of Higher Vocational Colleges Based on the Integration of Production and Education. *International Conference on Education Studies: Experience and Innovation (ICESEI 2020)*.
- [3] Shi, J. , Zhou, Z. , & Guo, H. . (2020). Analysis of the Research Status and Development Trend of Integration Production and Education Based on CiteSpace. *2020 International Conference on Information Science and Education (ICISE-IE)*.
- [4] Murillo-Vargas, G. , Gonzalez-Campo, C. H. , & Brath, D. I. . (2020). Mapping the integration of the sustainable development goals in universities: is it a field of study?. *Journal of Teacher Education for Sustainability*, 22(2), 7-25.
- [5] Rosenthal, A. , Guedes, A. , Santos, K. , & Deliza, R. . (2021). Healthy food innovation in sustainable food system 4.0: integration of entrepreneurship, research, and education. *Current Opinion in Food Science*(2015).
- [6] Wander, B. , Fernandes, A. , Daudt, C. , Gomes, M. Q. , & Pinto, M. . (2022). Curriculum integration in the formative assessment of distance continuing medical education: the use of integrative activities.
- [7] Ni, L. , Setini, M. , Ni, M. S. , Ni, N. Y. , Asih, D. , & Ni, M. . (2022). Entrepreneurship orientation in the handicraft industry in bali, indonesia using the triple helix concept. *International journal of productivity and quality management*(3), 35.
- [8] Zhou, H. , Zhao, L. , Hong, Y. , Dou, B. , & Wang, P. . (2021). Dna triple helix complex-functionalized electrochemical sensor for sensitive detection of microrna in human serum. *Journal of The Electrochemical Society*, 168(5).
- [9] Jiang, Y. , Zhao, W. , Zhou, H. , Zhang, Q. , & Zhang, S. . (2022). Atp-triggered intracellular in situ aggregation of a gold-nanoparticle-equipped triple-helix molecular switch for fluorescence imaging and photothermal tumor therapy. *Langmuir: The ACS Journal of Surfaces and Colloids*(12), 38.
- [10] Kelleher, L. , & Zecharia, A. . (2021). A triple helix systems perspective of uk drug discovery and development: a systematic review of ref impact case studies. *SAGE Publications*Sage UK: London, England(6).
- [11] Zhang, Q. , Zhang, Z. , Li, Z. , Li, S. , & Tang, T. . (2021). Evaluation of the production-education integration performance of the high-tech industry: an empirical comparison between three urban agglomerations in china. *Discrete Dynamics in Nature and Society*.