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**On the Educational Mechanism of Integrating Production, Learning, Research and  
Innovation Deeply in Higher Vocational Colleges**

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**Abstract.** At present, vocational education is placed in a more prominent position in educational reform and innovation and economic and social development. The deep integration of production, learning, research and innovation is an important measure to meet the requirements of vocational education reform under the new situation, and it is also an inevitable requirement for higher vocational colleges to realize the integration of industry, education and innovation. In view of the problems existing in the educational mechanism of higher vocational colleges, this paper constructs a whole process linkage mechanism of joint management, which takes the homomorphic regulation mechanism as the core, that is, the pre guarantee mechanism, the synchronous regulation mechanism, the feedback improvement mechanism as the main mechanism, supplemented by the dynamic interaction, the incentive constraint, the quality evaluation mechanism, and establishes the educational mechanism of deep integration of production, learning, research and innovation in higher vocational colleges.

### Introduction

At present, in the perspective of educational transformation, China's industry, University, research and innovation in-depth integration development process is facing important opportunities in policy, technology and the times. As an important support for the reform and implementation of Vocational Education in China, the construction of production, learning, research and innovation education mechanism plays an important basic role in the transformation and upgrading of education in China. Therefore, only by grasping many opportunities in the process of deep integration of industry, University, research and innovation, can we effectively promote the transformation and upgrading of education in China.

### Problems in the Deep Integration of Production, Teaching, Research and Innovation in Higher Vocational Colleges

**Insufficient understanding of the Regularity of the Deep Integration of Production, Learning, Research and Innovation in Higher Vocational Colleges.** Higher vocational colleges do not know enough about the laws of the deep integration of production, learning, research and innovation. First, the teachers do not grasp enough the principles and laws of the deep integration of production, learning, and innovation, especially lack of practical experience. Some teachers show a more obvious phenomenon of "talking on paper" when teaching, and it is difficult to combine professional theories and laws with actual cases, even if the combination is superficial, it is difficult to Secondly, some higher vocational colleges equate the deep integration of production, learning, research and innovation with employment guidance and career planning, so that when arranging teaching, they mainly rely on employment guidance teachers, ideological and political teachers, economic management teachers and even counselors to undertake teaching tasks. This seriously deviates from the direction of deep integration of production, learning, research and innovation in higher vocational colleges, and does not fully integrate the regularity of deep integration of production, learning, research and innovation into professional education.

**Lack of Systematic Understanding of the Deep Integration of Production, Learning, Research and Innovation in Higher Vocational Colleges.** The connotation of the deep integration of production, learning, research and innovation in higher vocational colleges is all inclusive, which is a typical embodiment of system theory. When higher vocational colleges carry out deep integration of production, learning, research and innovation, there are some deficiencies in their systematic understanding. Firstly, the consistency and systematization of the design of the teaching content of the deep integration of production, learning, research and innovation in higher vocational colleges have not been demonstrated. The common practice is to implement teaching for a course or a content, without forming a whole chain thinking, students will inevitably be at a loss when they receive education. Secondly, in the process of the deep integration of production, learning, research and innovation in higher vocational colleges, for The theoretical part pays more attention, but it is easy to ignore the practical education, and the government, industry and enterprises are not enough to participate. From the perspective of systematology, theory and practice should be unified and should not be biased. Third, the higher vocational colleges do not pay attention to the differences of the internal elements of the system when they carry out the deep integration of production, learning, research and innovation. They basically adopt the way of large class teaching, while ignoring the different understanding and requirements of different majors and students for "production", "research" and "innovation".

**Insufficient Understanding of the Effectiveness of the Deep Integration of Production, Learning, Research and Innovation in Higher Vocational Colleges.** Generally speaking, the understanding of the effectiveness of the deep integration of industry, learning, research and innovation in Higher Vocational Colleges remains in the traditional perspective

of employment and market. It is simply believed that the main purpose of the deep integration of industry, learning, research and innovation in higher vocational colleges is to promote employment or meet the market demand. In fact, for schools, the purpose of talent training is not limited to this. Some higher vocational colleges encourage teachers and students to apply for innovation and entrepreneurship projects, but lack of support in places, funds and other aspects, which limits the effect of deep integration of industry, learning, research and innovation in higher vocational colleges; the curriculum system of deep integration of industry, learning, research and innovation is not perfect, and some higher vocational colleges do not distinguish majors, do not investigate, simply copy the undergraduate education mode, but also influence The research and innovation teaching and talent evaluation standards are lack of pertinence and are not included in the assessment of students' professional performance.

### **The Key Points of Deep Integration of Production, Learning, Research and Innovation**

Many enterprises at home and abroad have made some achievements in product research and development, market development and other aspects by using the production, learning, research and innovation system. But for higher vocational colleges, the grasp of production, learning, research and creation system is not skilled enough.

First, higher vocational colleges should firmly grasp the dominant position in the deep integration of production, learning, research and innovation, give full play to the R&D advantages of enterprises and scientific research institutions, and further enhance the synergy between teaching, research and industrial development. China has a large number of enterprises and many types of ownership. The performance of enterprises in the international market has a direct impact on China's international competitiveness. Therefore, the advantages and disadvantages of the production-learning-research-innovation system mainly depend on the strength of its support ability for enterprise innovation, and on the market return rate of enterprise products and international market competitiveness. On the one hand, the ability of higher vocational colleges to grasp market demand information, on the other hand, the research and development support provided by higher vocational colleges for talent development and the technical support for enterprises and scientific research institutions.

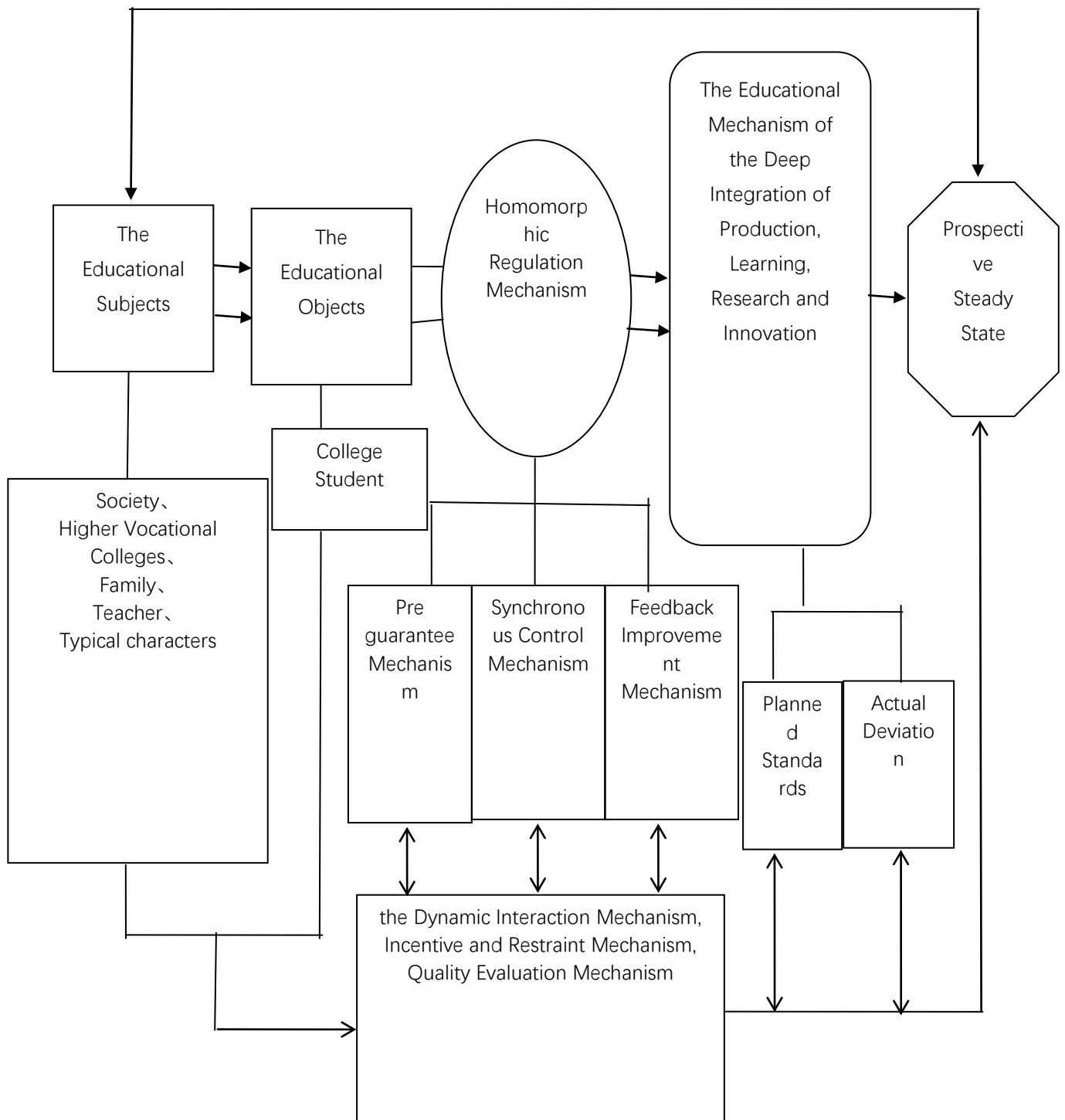
Second, if we want to cooperate and innovate, we should form an industrial alliance and focus on the national industrial development priorities. On the one hand, there is still a gap between the intensity of investment in scientific research in China and that in developed countries. In 2018, China's investment in scientific research reached RMB 1967.79 billion, accounting for 2.19% of GDP, which is far lower than the investment intensity of 3% - 4% in developed countries in Europe and the United States. On the other hand, the research funding support areas are too scattered, and it is still difficult to make breakthroughs in key areas. Therefore, it is necessary to use the industry university research and innovation system to form an industrial innovation and R&D alliance, focusing on key areas such as people's livelihood, sharing economy and green economy. For example, in order to make up for the shortcomings of multi-functional agricultural equipment manufacturing industry, the state has formulated relevant R&D strategies, organized more than half of the industry's R&D forces to form an alliance of institutions and personnel to tackle key problems, with remarkable results.

Third, establish a smooth and efficient integrated development system of production, learning, research and innovation, which is not only technological innovation, but also management innovation. Whether it is simply integrated innovation or the organization of R&D forces by a certain subject, there is a problem of how to integrate and optimize various R&D forces. In the process of practice, internal friction often increases due to various R&D forces fighting on their own, which makes it difficult to form a joint force of R&D. Therefore, to establish a smooth and efficient integrated development system of industry, University, research and innovation, the first is to determine the common goals of various subjects, such as vocational colleges, enterprises, research and development institutions; the second is to establish and improve the internal management mechanism of the system, and strengthen the self-discipline of various subjects; the third is to attach importance to the cultivation of leading figures, and play a leading role in the system. At the same time, as an important support for the implementation of national innovation strategy, it is necessary to continue to strengthen the government's guidance for the in-depth integration and development of the system.

### **The Practical Path of the Educational Mechanism of the Deep Integration of Production, Learning, Research and Innovation in Higher Vocational Colleges**

The deep integration of production, learning, research and innovation in higher vocational colleges is a dynamic system project involving society, school, family, teachers and students. A scientific, reasonable and perfect education mechanism is the basis for the steady progress of this project.

The author thinks that in view of the problems existing in the deep integration of production, learning, research and innovation in higher vocational colleges, we can build a whole process linkage mechanism of joint management, with the homomorphic regulation mechanism as the core, that is, to establish the deep integration of production, learning, research and innovation in higher vocational colleges, with the pre guarantee mechanism, synchronous regulation mechanism and feedback improvement mechanism as the main mechanism, supplemented by the dynamic interaction, incentive constraint and quality evaluation mechanism. As shown in the Fig. 1.



**Figure 1.** The educational mechanism of the deep integration of production, learning, research and innovation in Higher Vocational Colleges

### **Taking Pre guarantee Mechanism, Synchronous Control Mechanism and Feedback Improvement Mechanism as the Principal Tongs**

**Pre guarantee Mechanism.** The central issue of the pre guarantee is to prevent the deviation of the resources involved in the practice of the education mechanism of the deep integration of production, learning, research and innovation in Higher Vocational Colleges in terms of quality and quantity, mainly to do a good job in resource allocation, including personnel selection, material and technical equipment to ensure the needs of hardware and software. For example, whether the organization and leadership organization is sound, whether the implementation plan is scientific, whether the management rules and regulations are effective, whether the full-time and part-time team allocation and curriculum are reasonable, and whether the fixed standardized place resources are sufficient, etc. The deep integration of production, learning, research and innovation in higher vocational colleges should be carried out on a regular basis, or arranged flexibly according to needs; in

form, it can be a centralized lecture hall, a decentralized lecture hall, an organized lecture hall, and a spontaneous lecture hall; in content, it can be “creation”, it can be “innovation”, it can also be “start an undertaking”; in process, it can be a prescribed procedure. It can also be optional[1-3].

**Synchronous Control Mechanism.**According to the different characteristics of students in different stages, the deep integration of production, learning, research and innovation in higher vocational colleges should be adjusted and controlled synchronously by sections. Based on the activity principle of “full participation, emphasis and overall improvement”, students of different majors are differentiated and targeted education and practice are carried out. Especially in view of the actual situation that there are many students, classes, levels and organization difficulties, we can creatively move the class into the class, student apartment and community, make full use of the position of class, dormitory and community activities, and carry out education activities close to the actual situation of students. The specific method is: the school will project the curriculum, let the students carry out project research, project planning, project design, etc. as a team, and carry out evaluation activities. The tutor will give appropriate comments and guidance, and organize the students to carry out curriculum reconstruction and project reconstruction. Through this form, the goal of deep integration of production, learning, research and innovation into every student is realized. In the process of synchronous adjustment and control of the deep integration of production, learning, research and innovation in higher vocational colleges, enhancing the vitality of the classroom is the guarantee that students are willing to accept. This is not only to innovate in the content of the classroom, to grasp the pulse of the spirit of the times, but also to innovate in the form of the classroom, to take the form of students' favorite, and to give full play to the advantages of new media such as the Internet, to open up “online classroom”, “microblog classroom”, “wechat classroom”. Generally speaking, it is a process lecture mode that focuses on education in different time and space, integrates professional education with research and innovation education, combines theory with practice, and matches form with content[4].

**Feedback Improvement Mechanism.**Feedback improvement is a control method which takes the assessment and analysis of the final result of behavior as the basis of controlling future behavior. The central problem is to analyze and evaluate the deviation between the actual effect of deep integration of production, learning, research and innovation and the planned goal, which will play a guiding role and reference significance for future improvement. This requires that the organizers often keep in touch with students and participants, encourage those who are not covered to participate through acceptable ways or channels, such as adding quality credits, etc., and extend the effect of the classroom by discussion, debate, school summary, etc.

#### **Taking the Dynamic Interaction Mechanism, Incentive and Restraint Mechanism and Quality Evaluation Mechanism as Auxiliary Tools**

First of all, establish and improve the interactive mechanism of the deep integration of production, learning, research and innovation in higher vocational colleges. Nowadays, higher vocational colleges are not far away from the ivory tower of the society, but the place where all kinds of thoughts and cultures collide fiercely. They are the professional learning and actual battle positions for docking with the industry. All kinds of phased characteristics of industrial development will be reflected in the integration of industry and education. The essence of dynamic mechanism is to fully mobilize and give full play to the enthusiasm, initiative and creativity of students through certain benefit responsibility mechanism. First, give full play to the function of early warning. Practice has proved that the higher the participation and interaction of the deep integration education of production, learning, research and innovation in higher vocational colleges, the faster the information circulation, the more sound the creation and innovation function, and the easier the information is to eliminate the false and retain the true. The second is to create an atmosphere of free speech. In order to adapt to the new changes of industrial development and the new characteristics of teachers' and students' acceptance habits, we should pay attention to the popularization and popularization, and explore more effective ways and methods to promote the in-depth integrated education. For example, we can use the Internet, mobile phones and other emerging media to play the role of mainstream media and create the results of integration of professional industries[5].

Secondly, establish and improve the incentive and restraint mechanism of the deep integration of production, learning, research and innovation education in higher vocational colleges. Before the implementation, we should actively carry out the selection of entrepreneurial and technical experts, and commend the advanced; after the implementation, we should strengthen the inspection of organizations and the masses, and enhance the transparency of awarding the excellent and punishing the inferior. At the same time, there should be corresponding rewards and punishments for the tutor and the team. It is undeniable that this mechanism has played an important role in encouraging the advanced and preventing the backward in education.

Thirdly, establish and improve the evaluation mechanism of the quality of the deep integration of production, teaching, research and innovation education in higher vocational colleges. Whether the character image of push tree is distinct, whether its innovation and entrepreneurship leading role, and whether its professional skills are outstanding, should not be limited to qualitative analysis, but should be quantified to form a perceptible and perceptible tangible evaluation system. The quality evaluation should not only emphasize the organization assessment but also ignore whether the industry recognizes, whether the local needs, and whether the application value is high, so as to ensure the correction and correction of deviation, and the smooth expression channels of demands. Focus on strengthening the implementation of three systems: first, the learning and training system. We should strengthen the learning and training efforts of the tutors, so that the tutors are at the core of the in-depth integrated education of production, learning, research and innovation, and effectively undertake the responsibility of on-site scheduling, leading people to think, and helping people improve. All kinds of teachers, industry experts, outstanding graduates, students in school, etc. should be able to take on the responsibilities of mentors after proper training. And next, we should strengthen the study and training of students, especially in the practical ability. The second is the democratic

evaluation system, which takes teachers and students to report their thoughts and work (Study), develops criticism and self-criticism as the main content, understands the basic situation and ideological trends of the education process in time, and organically combines self-evaluation, mutual evaluation, mass evaluation and organizational evaluation. The third is the post responsibility system, which clarifies the post responsibilities of organizers, tutors, students, etc., formulates assessment rules, and takes the in-depth integration of industry, University, research and innovation education and the assessed results as the important basis for the annual target assessment.

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