



# Practical research on the construction of modern industry college in application-oriented universities

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**Abstract.** Modern Industry College is an important form of industry-education integration and an important carrier of the transformation of application-oriented undergraduate universities. From the perspective of cooperative innovation, this paper analyzes the dilemma of the development of cooperative innovation in modern industry colleges of application-oriented universities. This paper draws on the experience of our school in the construction of Industrial College, focusing on the school-running concept of modern industrial college with characteristics and serving the local economic construction, this paper puts forward the practical path of cooperative innovation of modern industry colleges from the perspectives of Cooperative Construction, specialty group coordination and teaching mode reform.

**Keywords:** Modern Industry College; Industry and education integration; collaborative innovation

## 1 Introduction

The Communist Party's 20th National Congress report calls for coordinated innovation in vocational education, higher education and Continuing education. Education should further promote the integration of vocational education, industry and education, science and education. In 2020, the Ministry of Education and the Ministry of Industry and Information Technology of the People's Republic of China jointly issued the "Guidelines for the construction of modern industry colleges (for trial implementation)", especially, it points out that "Taking the development of regional industry as the lead, facing the universities with distinct industry characteristics and close contact with industry, focusing on the application-oriented universities, constructing a group of modern industry colleges". Shandong province, such as the department of education issued "To promote the implementation of modern industry college construction program". However, there are some problems in the construction of modern industry colleges, such as the imperfect multi-party cooperation mechanism, the inconspicuous embodiment of the materialization of industry colleges, and the incomplete exertion of the platform advantages of industry colleges, etc. , in this paper, the integration of industry and education as a background, in view of the characteristics of our school's

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application-oriented colleges, practice to explore the construction of modern industrial college, to promote the development of higher education connotation.

## **2 Research background**

From the aspect of external image form research, Liu Shuang (2021) proposed that at present, there are three types of industrial colleges: Physical Industrial College, Physical Industrial College and Virtual Industrial College, in the form of cooperation, there are also multi-party cooperation, school-enterprise cooperation, government-enterprise cooperation and school-union (industry) cooperation Zhou Changjiang (2022) pointed out that in the construction of modern industry colleges, we should do a good job in the training of talents, teachers, scientific research and other links, fully solicit the development needs of the main body and the demands of the construction of industry colleges, perfect the top-level design, lay the policy foundation for the construction and long-term development of modern industry college[1-3].

From the aspect of the research on the specific functions of industrial colleges, Ning Qiyang (2022) proposed that the construction of industrial colleges should take the local industrial clusters as the tie to gather the advantages of policy, talents, industry and management, etc. , give full play to technical research and development, technical services, personnel training, cultural heritage and innovation and other functions. Liang Tong (2021) proposed that most modern industry colleges are built and developed on the basis of the colleges where the original majors are located, and the embodiment of the materialization is not obvious[4]. The strength of running a school and the motive force for development of modern industry colleges are affected, the platform advantage of industry college can not be brought into full play and so on.

## **3 Practical Research on the construction of modern industry college in application-oriented universities**

This research selects the modern industry college of ZET Smart City College, which is under construction in our university, as the object of study, to understand the real demand of enterprises, to study the real point of integration of enterprises and schools, and to grasp the future development direction of Industrial College.

### **3.1 Research on the synergetic development of specialty groups in modern industry colleges**

Starting from the students' cognitive law, the knowledge structure of different types of talents in industry is restructured, and the elements of talent training such as culture education, curriculum ideological and Political Education, innovation and entrepreneurship education are integrated, the formation of a number of professional links,

mutual penetration of professional groups to meet the individual development needs of students, training compound, innovative personnel.

### **3.2 Research on the reform of teaching and educating mode in industry college**

Following the development logic of industry frontier demand, combining the curriculum reform of professional groups, integrating relevant basic courses, professional skills courses and professional practice courses, actively integrating into the latest technical practice content of industry, to reconstruct the integrated teaching system of classroom, production, teaching, research and application, and to formulate a plan for the construction of teachers in industrial colleges, which integrates industry experts, enterprise backbones and professional teachers, it provides strong support for the innovation achievement and the core technology industrialization sharing resources back-feeding teaching.

### **3.3 Study on construction measures of multi-governance and sharing management system**

The marketability of enterprise operation and the Commonwealth of college education form the starting point and end point of different interests[5]. In-depth exploration of industry-led, government, industry, enterprises, schools multi-party resource sharing, shared responsibility, development co-management of the multi-agent collaborative governance methods, the establishment of industrial colleges and enterprises to integrate the fate of the community.

## **4 The implementation path of modern industry college construction**

On the basis of defining the rights and responsibilities of the coordination of governance, the government, school and enterprise should actively protect the interests of the participants and coordinate the interests of the participants.

### **4.1 Optimize the guarantee mechanism of collaborative governance**

#### **The government is the guide, overall planning, supervision and management.**

The Shandong provincial government plans and manages as a whole, implements the fund subsidy and the tax revenue benefit, establishes the quality guarantee mechanism, the perfect supervision and evaluation measure and so on, to guide, encourage, restrain and manage the enterprises and schools participating in the construction of modern industry colleges[6]. On the basis of defining the rights and responsibilities of the coordination of governance, the interests of the participants should be protected and the interests of the participants should be coordinated.

**Industry is the main participant, play a leading role in the industry.**

In the construction of Industrial College of Smart City, the enterprises in industries such as ZTE and Bosai are important participants, to fulfill the responsibilities of cooperative education in terms of formulating and developing cooperative projects, leading the development of professional and apprenticeship standards, providing investment in education by the coalition government, providing practical conditions, organizing skills training, conducting practical training, developing courses and teaching materials, and strengthening student management. While fulfilling the obligations of increasing educational expenditure, providing part-time teachers and providing a platform for practical teaching, in the community to get the right to speak, to get the right to give priority to the recruitment of staff, to get the application of scientific and technological innovation and the right to transform.

**School is the main body of running a school and plays the main role of education.**

Schools should give full play to their main role in education and seek government policy encouragement, investment in school-running conditions and special funding support, as well as financial support, site support, teacher support and information support from industry enterprises, to design teaching plan, adjust course system, strengthen teachers management, organize teaching implementation, etc. .Relying on the Artificial Intelligence Industry Institute's curriculum resources, training resources and“Online/offline” advantages, based on“Task-skills-knowledge points” to teach, this paper explores the realization of the dual-teacher classroom in innovative teaching and collaborative teaching research under the normalization.

The three-party cooperation of modern industry college breaks the dilemma of mutual isolation and“Integration without integration”, supports and cooperates with each other to form a community of different types, levels and levels, to better promote the integration of industry and education, science and education integration.

**4.2 Build professional group around industry chain of smart city**

The Industry College of Smart city was jointly established by schools and enterprises. The specialty cluster is composed of IoT engineering, data science, Big Data Technology, artificial intelligence, etc. , around the Internet of things as the core of IT industry chain, technology chain, talent chain, innovation chain, to create high-quality IT personnel training Highland and serve the development of Shandong. Combined with the characteristics of application-oriented universities, the specialty group aims to cultivate the engineers and other talents in the field of smart city on the basis of Internet of things communication technology, so as to meet the needs of different technical talents in the middle and lower industrial chain.

### **4.3 Construction of "Five modules and four capabilities" Internet of Things professional group course system**

The courses of the three majors of Internet of Things engineering, data science and big Data technology, and artificial intelligence are unified planning, and the compulsory "general education course" and "professional group basic course" are set up to consolidate the common professional foundation of professional groups. Students choose "professional group orientation courses" independently to cultivate the core skills of the post; Students choose "courses selected among professional groups" independently in order to cultivate knowledge and skills across professional groups and realize personalized and compound talent training. Integrating the talent training elements of innovation and entrepreneurship education, the course system of Internet of Things professional group is built according to the progressive thinking of four abilities: basic ability, special ability, comprehensive ability and innovation ability.

### **4.4 The project runs through the whole teaching process, and the professional learning cloud platform covers the whole professional learning process**

School teachers and enterprise engineers form a textbook construction team to collect typical project cases of each cooperative enterprise, according to the project corresponding "Post tasks, knowledge points, skills points", construction and development of a number of teaching materials with industrial elements. Building a professional learning cloud platform which integrates the course content, learning schedule and operating environment, applying the teaching resources on the platform comprehensively, carrying out targeted guiding activities for students, we will promote advanced teaching methods such as mixed teaching and project-based teaching. At the same time, we will carry out "Double-teacher classroom" according to the needs of the industry.

### **4.5 The construction of three platforms for innovation in the specialty cluster of smart cities**

First of all, under the overall planning of the industry institute, for the middle and downstream industries in the smart city industry chain, set up a studio on campus, combined with actual complex engineering cases, through participation in various disciplines competition, the application of national patents to cultivate students' ability. Secondly, the United Enterprise to build a practice training base, through the implementation of real projects, teachers and students to complete the project research and published papers. At the same time, the University and enterprise build a service platform for production, study and research, pay attention to the transformation of scientific research results, inspire students to start a business and carry out company incubation.

In the practice of innovation and entrepreneurship, the Industrial Institute uses reverse order form, from the post task analysis skills points, and then quantitative

knowledge points. School-enterprise teachers jointly develop course group teaching materials, continuously update teaching methods, complement each other's advantages, and carry out "Double-teacher classroom", design "Host + coach" online and offline integrated diversified activities.

## 5 Conclusion

This article mainly relies on the school's smart city modern industry college in the talent, technology, industry advantages, results-oriented, cross-border and cross-professional levels to build a "Studio-base-center" three platforms for practice and innovation. Students can choose the platform and project of practical teaching according to their personal interest, basic learning and vocational inclination, which can satisfy the learning needs of students at different levels, and to meet the needs of enterprises at different levels of talent. The United Enterprise shall build a platform for applied technology research and transformation, a platform for professional competence innovation and a platform for incubating innovation and entrepreneurship, and promote the organic integration of the industrial chain, the innovation chain, the education chain and the talent chain, the establishment of application-oriented universities can be used for reference to promote the construction of smart city professional groups.

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