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Research on Ecosystem Model Construction and Operation Mechanism of Innovation and Entrepreneurship Education in Application-oriented Universities Based on Ecosystem Theory

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Abstract: *As a new topic in higher education reform, innovation and entrepreneurship education provides new opportunities for the reform of application-oriented undergraduate education. This article analyzes the current development status of innovation and entrepreneurship education in application-oriented undergraduate universities, constructs an innovation and entrepreneurship education ecosystem model based on ecosystem theory, and analyses its operational mechanism from five aspects: balance mechanism, coordination mechanism, dynamic mechanism, control mechanism, and coordinated development mechanism. Finally, the article proposes a multi-drive mechanism of "university-led + government-guided + enterprise participation" from three aspects: innovative cultivation mode, curriculum system innovation, and practical platform innovation.*

Keywords: *ecosystem theory, innovation and entrepreneurship education, system model, operating mechanism*

1. Introduction

At present, China's higher education has entered the popularization stage, and the contradiction between the popularization of higher education and the quality of personnel training has become increasingly prominent. How to improve the quality of innovative and entrepreneurial talents has become the focus of social attention. The number of college graduates of the class of 2023 reached an all-time high of 11.58 million, according to the 2023 Chinese College students Employment report released by China Education online. Therefore, how to improve the level of innovation and entrepreneurship education by optimizing the talent training mode and strengthening the construction of teachers has become an important task for the reform and development of application-oriented colleges and universities[1]. In this context, ecosystem theory has been introduced into the field of innovation and entrepreneurship education, and has gradually become an important theoretical basis in the field of innovation and entrepreneurship education. Ecosystem theory is the product of the intersection of ecology and social sciences, which emphasizes the study of the interaction between the internal elements of complex systems. At present, the research on ecosystem theory and its application in the field of education at home and abroad is mainly focused on the macro level, such as educational ecology, ecosystem theory, niche theory and so on. There are few researches on the application of ecosystem theory in the field of innovation and entrepreneurship education, and it is mainly analyzed from the perspective of ecology. For example, through the analysis of the problems existing in the ecosystem of college students' innovation and entrepreneurship education under the background of "Internet +", Li Yanxia and others put forward the countermeasures to optimize the ecosystem of college students' innovation and entrepreneurship education under the background of "Internet +". However, most of the above studies are a single analysis of a certain field, lack of comprehensive analysis from an overall point of view[2]. Therefore, this paper introduces the ecosystem theory into the field of innovation and entrepreneurship education, takes application-oriented universities as the research object, constructs the ecosystem model of innovation and entrepreneurship education in application-oriented universities based on talent training and puts forward its operating mechanism. To a certain extent, this study makes up for the deficiency of innovation and entrepreneurship education in application-oriented colleges and universities in China, and enriches the relevant theories of innovation and entrepreneurship education.

ISSN 2616-5783 Vol.6, Issue 25: 91-97, DOI: 10.25236/AJHSS.2023.062515

2. The connotation of the ecosystem of innovation and entrepreneurship education in colleges and universities

The ecosystem of innovation and entrepreneurship education in colleges and universities refers to an ecosystem composed of internal and external relevant subjects, which aims to cultivate students' innovative and entrepreneurial ability and promote the sustainable development of innovative and entrepreneurial activities[3]. This ecosystem covers a number of aspects:

First of all, it includes the teaching and training system of colleges and universities. Colleges and universities should build an omni-directional training system for innovation and entrepreneurship education, such as the establishment of innovation and entrepreneurship courses, the organization of practical activities of innovation and entrepreneurship, and so on. These teaching and training systems should be able to meet the needs of students' knowledge, skills and abilities, and cultivate students' innovative thinking, entrepreneurial consciousness and practical ability.

Secondly, it should also include the construction of innovation and entrepreneurship resources and platforms in colleges and universities. Colleges and universities need to provide rich innovative entrepreneurial resources, such as entrepreneurial mentors, innovative entrepreneurial bases, laboratories and financial support. At the same time, colleges and universities should also build an innovation and entrepreneurship platform to provide students with opportunities to demonstrate and practice, such as innovation and entrepreneurship competitions, business incubators and so on, so that students can exercise and develop their abilities in actual innovation and entrepreneurship projects.

Third, the ecosystem of innovation and entrepreneurship education in colleges and universities also needs to include cooperation and exchange mechanisms. Colleges and universities should establish close cooperative relations with enterprises, scientific research institutions and social organizations to jointly carry out innovation and entrepreneurship education activities. This kind of cooperation can include project cooperation, talent training cooperation, technical exchange and so on. Through cooperation and exchange, students' practical opportunities and abilities can be increased.

Finally, the ecosystem of innovation and entrepreneurship education in colleges and universities should also include the shaping of innovation and entrepreneurship culture and the transmission of values. Colleges and universities should actively cultivate students' awareness and spirit of innovation and entrepreneurship, and advocate an innovative and entrepreneurial culture that is bold in innovation, dare to challenge, willing to cooperate and enterprising. At the same time, colleges and universities should also convey correct values, guide students to establish a correct concept of innovation and entrepreneurship, and cultivate students' sense of social responsibility and awareness of sustainable development.

To sum up, the ecosystem of innovative entrepreneurship education in colleges and universities includes teaching and training system, the construction of innovative entrepreneurial resources and platform, the mechanism of cooperation and exchange, the shaping of innovative entrepreneurial culture and the transmission of values. The contents of these aspects are intertwined and promote each other, forming a comprehensive and organic ecosystem of innovation and entrepreneurship education, which provides a good environment and support for the cultivation of students' innovation and entrepreneurship ability.

3. The construction of the ecosystem model of innovation and entrepreneurship education in colleges and universities

The word "ecology" originates from biology, emphasizes the interaction, interdependence, mutual restriction and mutual promotion between system and environment, and has the characteristics of integrity, relevance, dynamics and so on. Combined with the ecological characteristics of innovation and entrepreneurship education, starting from the ecosystem theory, combined with the educational concept and school-running orientation of application-oriented universities, this paper constructs the ecosystem model of innovation and entrepreneurship education in application-oriented colleges and universities (Figure 1).

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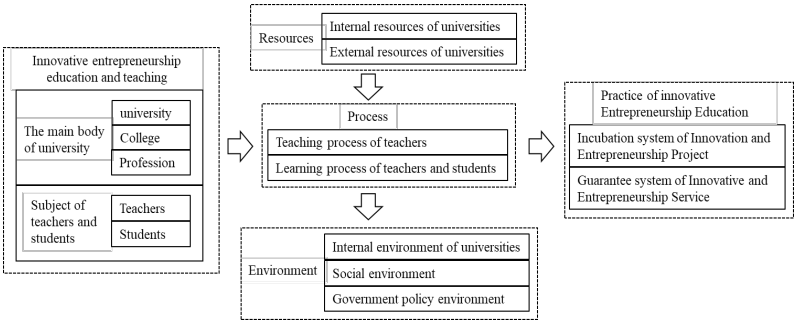

Figure 1: Model diagram of innovation and entrepreneurship ecosystem in universities

In innovation and entrepreneurship education, as the core element of the whole innovation and entrepreneurship ecosystem, innovation and entrepreneurship education is not only the foundation of the ecosystem, but also the core element. At the same time, as a complex social system, innovation and entrepreneurship education also has the characteristics of complexity and openness. Therefore, the model is divided into the following modules: first, the "human" module, that is, the main body of innovation and entrepreneurship education of various departments, colleges and majors, as well as the main body of teachers and students; the second is the "environment" module, that is, the internal environment, social environment and government policy environment of colleges and universities; the third is the "process" module, that is, the teaching process and the learning process of teachers and students; the fourth is the "resources" module, that is, the internal and external resources of colleges and universities. The fifth is the "practice" module, namely the incubation system of innovation and entrepreneurship projects and the service guarantee system of innovation and entrepreneurship.

The model takes innovation and entrepreneurship education as a system as a whole, and has the characteristics of integrity, relevance and dynamics. The sub-modules are interrelated and interdependent. Among them, the teaching process and the learning process of teachers and students promote each other. The teaching process can not only improve students' innovative and entrepreneurial ability and literacy, but also enable students to better understand social needs. Teachers can improve the comprehensive quality and ability of students through guidance and help to students; society provides a practical platform and opportunities for innovation and entrepreneurship education in colleges and universities; the government provides protection for innovation and entrepreneurship education in colleges and universities through the formulation of relevant policies and regulations.

4. Analysis on the operating mechanism of the ecosystem of innovation and entrepreneurship education in colleges and universities

The operation mechanism of the innovation and entrepreneurship ecosystem of application-oriented colleges and universities includes: balance mechanism, which refers to the quantitative and structural relationship among the elements; coordination mechanism, which refers to the structural and functional relationship between the elements; dynamic mechanism, refers to the dynamic relationship between the elements; control mechanism, refers to the relationship between the elements within the system. These four aspects are an organic whole which are interrelated, interdependent and restrict each other.

4.1 Balance mechanism

The balance mechanism refers to the quantitative and structural relationship between the elements in the system, as well as the structural and functional relationship between the elements. First of all, the elements should maintain a reasonable quantitative relationship, so that the elements in the system are interrelated, interact and depend on each other to form an organic whole. Secondly, it is necessary to maintain a reasonable structural relationship between the elements, that is, the roles and functions of the elements in the system are limited to a certain extent. Within this scope, various elements interact with each other and can have a positive impact, while beyond this scope, it will have a negative impact. Finally, a reasonable functional relationship should be maintained among the elements. If the function of an element of a system is too strong or too weak, it will adversely affect the development of the system as a whole[4]. There are both competition and cooperation among the elements in the innovation and entrepreneurship ecosystem of application-oriented universities, so there are both competition and cooperation among the elements. In this complex and diverse relationship, the elements must achieve the role of interdependence, mutual restriction and mutual promotion within a relatively reasonable scope.

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Therefore, the innovation and entrepreneurship ecosystem of application-oriented colleges and universities must establish a perfect balance mechanism to maintain a reasonable, balanced and orderly relationship among the elements, so that it can operate normally and develop continuously.

4.2 Coordination mechanism

In the ecosystem of innovation and entrepreneurship education, the elements are not only interdependent, but also restrict each other. Therefore, a corresponding coordination mechanism must be established. Specifically, there are three relationships among the internal elements of the innovation and entrepreneurship ecosystem: structural functional relationship, structural functional relationship and structural functional restriction. First of all, the structural functional connection. The structure of the internal elements of the innovation and entrepreneurship education ecosystem is mainly reflected in the goal, environment, organizational form and management mode and so on. The goal refers to the relationship between the internal elements of the innovation and entrepreneurship education ecosystem that promote and support each other; the environment refers to the internal and external environment of the internal elements of the innovation and entrepreneurship education ecosystem, including policy environment, economic environment, cultural environment and technological environment, etc.; organizational forms mainly include schools, enterprises, governments and other social organizations. The management mode mainly includes the idea management mode and the function management mode. There is a mutual influence and interaction among the elements in the innovation and entrepreneurship education ecosystem, only through the establishment of an effective coordination mechanism, can the internal elements of the system achieve coordinated development in the aspects of objectives, organizational forms and management models, and form an organic whole[5]. There is a certain degree of conflict among the elements in the ecosystem of innovation and entrepreneurship education. this conflict is shown in the following aspects: between innovation and entrepreneurship education ecosystem and other educational ecosystems, between innovation and entrepreneurship education and other professional education, and between innovation and entrepreneurship education and practical teaching. Through the effective coordination mechanism, the internal elements of the innovation and entrepreneurship education ecosystem can achieve structural and functional coordination, so that the internal elements of the whole system not only restrict each other but also promote each other. Specifically, it is necessary to standardize the relationship and behavior of various elements within the ecosystem of innovation and entrepreneurship education by establishing relevant policies, regulations and mechanisms, and to provide necessary financial support for the ecosystem of innovation and entrepreneurship education by establishing a capital investment mechanism. It is necessary to establish a talent training mechanism to train high-quality talents for the ecosystem of innovation and entrepreneurship education. It is necessary to establish an evaluation system to guide the healthy development of innovation and entrepreneurship education ecosystem.

4.3 Dynamic mechanism

Dynamic mechanism refers to the dynamic relationship between the interaction of various elements. In the operating mechanism of the innovation and entrepreneurship ecosystem, there are both competition and cooperation among the various elements. Only by forming a benign interaction between the various elements can the healthy development of the system as a whole be promoted. This paper takes the elements of the innovation and entrepreneurship ecosystem as the source of power, namely, the government, enterprises, university teachers and students. Among them, the government mainly plays a leading role; enterprises mainly play a promoting role; university teachers mainly play a driving role; students mainly play an internal driving role.

There is interaction and interaction among innovation and entrepreneurship ecosystems at different levels and stages. In the stage of innovation and entrepreneurship education, colleges and universities should make clear the goal orientation, give full play to the characteristic advantages, improve the system and mechanism, and improve the enthusiasm and initiative of teachers and students to participate in innovation and entrepreneurship activities to a certain extent. Enterprises should make use of their own advantages to participate in innovation and entrepreneurship education activities and encourage teachers to carry out research work. In the stage of achievement transformation, enterprises should participate in innovation and entrepreneurship education activities from the aspects of research and development, production, sales and so on[6]. Therefore, colleges and universities should constantly carry out internal optimization adjustment and external integration adjustment according to their own positioning and goals; the government should constantly improve the system of policies and regulations according to market

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demand; enterprises should make full use of their own advantages to participate in innovation and entrepreneurship education activities.

4.4 Control mechanism

The control mechanism refers to the relationship between ecological subjects and ecological services, which is mainly reflected in the policy, system and environment of innovation and entrepreneurship education. First of all, the policy of innovation and entrepreneurship education is an important means of control mechanism. In terms of policy, the government should create a good environment for innovation and entrepreneurship education in colleges and universities, provide financial and human resource support to colleges and universities, and provide support in terms of funds and venues, so as to provide good external conditions for innovation and entrepreneurship education. Secondly, the government should establish and improve the system of laws and regulations, through the formulation of laws and regulations to regulate the relationship among the government, enterprises, universities, social organizations and other subjects. At the same time, it is also necessary to formulate and improve laws and regulations to protect the legitimate rights and interests of various ecological subjects. Thirdly, the government should strengthen the supervision of the environment of innovation and entrepreneurship education in colleges and universities, especially those factors that are not conducive to the development of innovation and entrepreneurship education, and ensure that the policies are in place. At the same time, the government should also provide necessary information support and information feedback for all subjects. Finally, colleges and universities should play their own role and constantly improve the level of running a school and the quality of personnel training[7]. Colleges and universities should focus on three aspects in the process of innovation and entrepreneurship education: first, to strengthen the construction of teaching staff. It is necessary to introduce high-level teachers as professors of innovative entrepreneurship education courses, and at the same time strengthen teacher training to improve the overall quality of teachers. The second is to deepen industry-university-research cooperation. It is necessary to build an innovative and entrepreneurial education system with the combination of industry, university and research, strengthen the cooperation, exchange and cooperation between schools and enterprises, and realize the sharing of resources and complementary advantages between enterprises and universities. Third, carry out practical teaching activities. It is necessary to establish practical teaching bases and off-campus practical training bases to enhance students' practical ability; at the same time, they should also actively carry out rich and colorful campus cultural activities and social practical activities to constantly improve the comprehensive quality of students.

4.5 Coordinated development mechanism

Innovation and entrepreneurship education is a kind of comprehensive education, which aims at training innovative and entrepreneurial talents, and organically combines innovation and entrepreneurship education with professional education, theoretical education and practical teaching. Only under this new mode can we give full play to the role of innovation and entrepreneurship education in application-oriented colleges and universities. Therefore, we should fully realize that innovation and entrepreneurship education is not a simple teaching activity, but a systematic project with the participation and coordinated development of teachers, students, schools and the government. Only when the elements coordinate and promote each other, can the whole system reach the best state. First of all, in order to achieve coordinated development in concept, innovative entrepreneurship education is a new educational concept and school-running mode, which needs the reform and renewal of ideas and ways of thinking. Secondly, it is necessary to achieve coordinated development in the system. In the whole innovation and entrepreneurship ecosystem, universities and the government are the leaders, while enterprises are the participants and service providers. Colleges and universities need the support of the government to play a leading role in innovation and entrepreneurship education. Finally, to achieve coordinated development in management, it is necessary to establish a set of scientific and efficient management mechanism.

The functions of the operation mechanism of innovation and entrepreneurship ecosystem in application-oriented universities are as follows: first, to integrate resources to form complementary advantages; second, coordinated development to achieve benign interaction; third, scientific evaluation to promote sustainable development. On the one hand, we should optimize the resource allocation structure of innovation and entrepreneurship education and give full play to the policy guiding role of the government; on the other hand, we should give full play to the important role of enterprises in innovation and entrepreneurship education to stimulate the enthusiasm and initiative of teachers and

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students in colleges and universities; at the same time, we should establish a scientific evaluation system to promote the sustainable development of innovation and entrepreneurship education.

5. Analysis on the optimization path of innovation and entrepreneurship education ecosystem in colleges and universities

5.1 Innovation of training mode

Application-oriented colleges and universities should change from the traditional ternary model of "classroom teaching + employment guidance + innovative entrepreneurship training" to "classroom teaching + practical training + innovative entrepreneurship education". In classroom teaching, we should highlight the cultivation of ability and emphasize the all-round development of students' knowledge, ability and quality; in practical training, we should highlight students' application ability and emphasize the cultivation of students' practical ability; in innovative and entrepreneurial education, highlight students' innovative consciousness and spirit. In addition, we should pay attention to the cooperation between schools and enterprises and the combination of industry, university and research, improve the construction of off-campus practice bases, and provide students with more practical opportunities. Application-oriented colleges and universities should also attach importance to the cultivation of students' practical ability of innovation and entrepreneurship. In the specialty setting, we should keep up with the social demand and provide high-quality applied talents for the national economic and social development; in the curriculum system, we should increase the proportion of entrepreneurial courses and professional courses; in teaching methods, we should pay attention to entrepreneurship education and entrepreneurship practice.

5.2 Curriculum system innovation

When formulating the talent training plan, the application-oriented colleges and universities should bring the innovation and entrepreneurship education into the professional training plan, take the specialty as the orientation, take the students' needs as the guidance, and set up special innovation and entrepreneurship courses in the teaching plan. At the same time, we should promote the organic integration of innovation and entrepreneurship curriculum with professional education and innovation practice, and build a curriculum system with the combination of "in-class and extracurricular". In classroom teaching, equal attention should be paid to theoretical teaching and practical teaching to cultivate students' innovative thinking and entrepreneurial ability. Strengthen the interdisciplinary integration, encourage teachers to carry out interdisciplinary comprehensive and interdisciplinary research, and realize the collaborative innovation of industry, university, research and application.

In terms of curriculum design, innovation and entrepreneurship education can be integrated with professional education. On the one hand, we can combine professional education with innovation and entrepreneurship education to enrich the content of the curriculum system; on the other hand, we can combine innovation and entrepreneurship education with professional education to broaden the content of the curriculum system. In addition, professional courses can be combined with practical teaching. On the other hand, professional courses can be designed into project teaching, case teaching, group discussion, role-playing and other forms; on the other hand, practical teaching can be designed into laboratory practice, enterprise practice, social practice and other forms. Through the combination of theory and practice, we can cultivate students' comprehensive quality and ability.

5.3 Practice platform innovation

According to the principle of "relying on specialties and giving consideration to advantages", application-oriented colleges and universities should carry out innovation and entrepreneurship education throughout the whole process of personnel training, integrate internal and external resources, and create an omni-directional and three-dimensional practice platform for innovation and entrepreneurship. First, improve the construction of on-campus practice base. Application-oriented colleges and universities should increase investment and actively build a number of on-campus practice bases such as "Innovation and Entrepreneurship Education practice Base", "Innovation Entrepreneurship Competition training Base" and "College students' Entrepreneurship Park", so as to provide a platform and support for students' innovation and entrepreneurship training. Second, strengthen the construction of off-campus practice platform. Application-oriented colleges and universities should actively build an off-campus practice platform characterized by school-enterprise cooperation and the combination of industry, university and research, so as to provide practical places and opportunities for students' innovation and entrepreneurship. Third, rely on cooperative enterprises and industry associations to build

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off-campus practice bases. Fourth, to create a diversified social practice platform. Application-oriented colleges and universities should actively build a five-in-one social practice platform system of "government + enterprise + school + community + trade association", so as to promote the close combination of innovation and entrepreneurship education with students' professional study, social practice and graduation practice. Fifth, strengthen the construction of entrepreneurial incubation base. Application-oriented colleges and universities should actively build incubation bases based on "incubator", "mass innovation space" and "entrepreneurial service center", so as to provide students with low-cost, convenient and all-factor entrepreneurial incubation services.

6. Conclusion

As a research method and way of thinking, ecosystem theory provides a new idea for the reform of innovation and entrepreneurship education in colleges and universities. Based on the ecological analysis of innovation and entrepreneurship ecosystem in application-oriented colleges and universities, an innovation and entrepreneurship ecosystem model is constructed, which is composed of element layer, platform layer and environment layer. And its operating mechanism is studied from two aspects: the element layer and the platform layer. This paper puts forward the operation mechanism of the innovation and entrepreneurship ecosystem of application-oriented colleges and universities: (1) by establishing a scientific and reasonable talent training system and optimizing the allocation of resources, constantly improve the professional ability of teachers; (2) through the establishment of a perfect entrepreneurial platform system to provide quality services for innovative entrepreneurs; (3) through the construction of innovative entrepreneurial curriculum system to achieve education and teaching reform.

With the continuous development of the concept of innovation and entrepreneurship education, the innovation and entrepreneurship ecosystem of colleges and universities is also developing. In the research on the ecosystem model construction and operation mechanism of innovation and entrepreneurship education in application-oriented colleges and universities, the relationship among various elements should be further optimized. To build an operating mechanism of harmonious symbiosis and coordinated development with the ability of self-organization, self-renewal and self-evolution, and constantly promote the high-quality development of innovation and entrepreneurship education in application-oriented colleges and universities.

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References

[1] Chen,J G.,Zhu,X J. Construction and Practice of Innovation and Entrepreneurship Education Ecosystem in Local Universities [J].Journal of Taizhou University, 2018,40(04):61-64.
[2] Jia,J F.,Zhao,R N,Zhu, Z.The construction of innovation and entrepreneurical education ecosystem in universities: Nulti-case study based on the universities in the U.S., the UK and Japan [J].Journal of Management Case Studies, 2021,14(03):309-324.
[3] Du, H R.On the Ecosystem Construction of Innovation and Entrepreneurship Education in Universities [J].Education research monthly, 2023 (02):43-52.
[4] Wang, H. Construction and Operation Mechanism of College Innovation and Entrepreneurship Education Ecosystem[J].Journal of Beijing University of Posts and Telecommunications(Social Sciences Edition), 2022,24 (01):95-101.
[5] Qiu, L X. Research on Establishment and Evaluation Index of Entrepreneurship Education Ecosystem in High Quality Development [J].Journal of Liuzhou vocational and technical college, 2022,22 (06):96-101.
[6] Tian, J. Establishment of College Innovation and Entrepreneurship Education Ecosystem Model Based on Vocational Education [J].Continuing Education Research, 2022 (05):80-84.
[7] Ni G A, Gao T X, Wang L P, Wu L B. The Construction of Innovation and Entrepreneurship Education Ecosystem in Colleges and Universities under the Perspective of "Collaborative Education" [J].Journal of Tongling college, 2020 (06):110-116.