

On the Construction of Innovation and Entrepreneurship Education System in Applied Local Universities: Exploration Based on the Practice of S College

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Abstract: Against the backdrop of the innovation-driven development strategy, application-oriented local universities are in urgent need of expediting the establishment of an innovative and entrepreneurial education system that aligns with regional development demands. Taking S College as a case study, this paper employs a combination of case research and model construction methodologies to tackle the challenges present in its dual innovation and entrepreneurship education, including an inadequate platform operation mechanism, misconceptions in educational philosophy, and a lack of systematic curriculum design. A novel educational framework, termed "Three-Dimensional, Four-System, Five-Transformation," has been developed. This framework is anchored in three key dimensions: industry-education integration, competency orientation, and regional service. It leverages four interconnected subsystems—teaching mode, curriculum system, resource allocation, and performance evaluation—to strive for the professionalization of educational content, the integration of system operations, the platformization of resource support, the systematization of the educational ecosystem, and the sustainability of the development model. Research findings indicate that through a three-phase implementation pathway and a multifaceted support mechanism, this system has effectively enhanced the quality of dual innovation and entrepreneurship education and the efficiency of transforming educational outcomes. It not only offers a replicable implementation model for similar institutions but also provides theoretical insights and practical approaches for

fostering the deep integration and advancement of higher education with the local economy.

Keywords: Application-Oriented Universities; Innovation and Entrepreneurship Education; Education System; Industry-Education Integration; Education Evaluation

1. Introduction

In the context of innovation-driven development and economic structural transformation, application-oriented local universities shoulder the important mission of cultivating high-quality application-oriented talents for regional economic and social development. Innovation and entrepreneurship education, as an important breakthrough in higher education reform, is a key path to improve the quality of talent cultivation and enhance the ability to serve the local community[1]. However, many application-oriented universities still face practical difficulties such as imperfect systems, scattered resources, and a disconnect between production and education in the process of promoting innovation and entrepreneurship education. As a representative application-oriented undergraduate institution[2], S College has conducted systematic exploration in innovation and entrepreneurship education in recent years, accumulated rich experience, and also identified several deep-seated issues. Based on the practice of S College, this article attempts to construct a systematic and operable innovation and entrepreneurship education system, with a view to providing reference for similar universities.

Currently, domestic and foreign scholars' research on the innovation and entrepreneurship education system mainly focuses on the

following aspects: First, emphasizing the importance of industry-education integration, and believing that school-enterprise cooperation is the key to improving the quality of innovation and entrepreneurship education[3]. Second, paying attention to the construction of the curriculum system, advocating the integration of innovation and entrepreneurship education into the entire process of professional education[4]. Third, valuing the innovation of evaluation mechanisms, proposing the establishment of a diversified evaluation system[5]. Most research focuses on a specific aspect, lacking a systematic construction of the innovation and entrepreneurship education system in application-oriented universities, especially in terms of system architecture, implementation paths, and safeguard mechanisms. This study aims to address the deficiencies in existing research and further improve and systematically construct the innovation and entrepreneurship education system.

2. The Effectiveness and Challenges of Innovation and Entrepreneurship Education in S College

2.1 Major Achievements

As a typical representative of an application-oriented local undergraduate university, College S has achieved remarkable results in the field of innovation and entrepreneurship education in recent years, forming a distinctive practical path. First, in terms of innovation and entrepreneurship education models, the college has implemented the "Five Questions and Five Constructions" education model, systematically constructing an innovation and entrepreneurship education framework. This model realizes the precise alignment of industry demands and educational supply through five paths: asking about industry needs to build professional clusters, asking about technological development to build new-type courses, asking about students' interests to build learning communities, asking about internal and external resources to build maker spaces, and asking about international frontiers to establish evaluation standards. In the past three years, the college has established 57 innovation and entrepreneurship experimental competition classes, students have been granted 68 patents, including 21 invention patents, 222 provincial-

level or higher innovation and entrepreneurship projects have been approved, and 828 awards have been won in national A-level discipline competitions. Second, in terms of resource allocation, the college has built a dual-cycle resource platform of "on-campus and off-campus." On-campus, it has established innovation and entrepreneurship zones and JD production-education integration bases as nurseries; off-campus, it has established incubation bases relying on local software parks and university science parks, forming a network of 58 on- and off-campus linked practice platforms. Especially, the "Three Firsts" model developed in cooperation with JD Group—the first strategic agreement signed with JD Headquarters, the first release of JD Industrial College construction standards, and the first provincial key JD Modern Industrial College approved—has become a model of industry-education integration. Third, in terms of the curriculum system, the college has implemented the "Five Innovations Integration" curriculum foundation project, breaking down innovation and entrepreneurship education into five organic components: Thought-Innovation Integration (incorporating ideological and political elements), Professional-Innovation Integration (based on professional education), Scientific-Innovation Integration (driven by research projects), Competition-Innovation Integration (guided by discipline competitions), and Industry-Innovation Integration (aligned with industrial chains). The college has set 6 required innovation and entrepreneurship credits (2 theoretical credits and 4 practical credits) in the talent training program, building a curriculum system that covers the entire process. Fourth, in terms of the evaluation mechanism, the college has established a diversified evaluation system of "Four Combinations, Four Participants, and Five Dimensions." "Four Combinations" refers to the integration of process-oriented, developmental, summative, and value-added evaluations; "Four Participants" include enterprise mentors, on-campus teachers, students, and learning platforms; and "Five Dimensions" cover online assessments, student self-assessments, group peer reviews, teacher evaluations, and enterprise assessments. This evaluation system breaks the limitations of traditional single assessments, aligning more closely with the intrinsic requirements of innovation and

entrepreneurship education, which emphasizes process, practice, and capability development.

2.2 Existing Problems

Despite significant progress in the field of innovation and entrepreneurship education in recent years, S College still faces a series of deep-seated challenges that urgently need to be addressed from a systemic level. Firstly, in terms of the operational mechanism of the school-local cooperation platform, there are prominent issues such as the difficulty in maintaining activities, low efficiency in transforming achievements, and limited student participation. Some platforms still primarily focus on single events and have not established a sustainable operational model, leading to low resource investment efficiency, limited student coverage and benefit, and the platform's educational function not being fully realized. Secondly, from the perspective of educational cognition, the survey found that some departments within the school still have cognitive biases towards innovation and entrepreneurship education, such as equating "entrepreneurship education simply with starting a business" and viewing it one-sidedly as a tool to alleviate employment pressure. This cognitive bias leads to insufficient motivation for participating in courses, with some students only selecting courses to meet credit requirements, greatly reducing the effectiveness of education. Thirdly, in terms of the curriculum system, entrepreneurship education courses are mostly offered as electives, lacking systematic arrangement and hierarchy; there is a prominent phenomenon of "two skins" between professional courses and innovation and entrepreneurship education, with insufficient integration between majors and entrepreneurship; practical links are weak, and the integration of real-life business scenarios is insufficient. In the revision of the undergraduate talent training plan for the 2025 grade, colleges generally reflected that "professional characteristics are not prominent enough and curriculum resources urgently need to be optimized". In addition, in terms of faculty, there is a severe shortage of innovation and entrepreneurship mentors with practical enterprise experience, and existing teachers tend to focus more on theoretical teaching; external mentors have low participation and high mobility, making it difficult for them to

deeply integrate into teaching. Although the school plans to establish a 300-person dual-entrepreneurship mentor pool by the end of 2025, the quality and structure of teachers still need to be optimized. Finally, in terms of the mechanism for transforming achievements, the alignment between student innovation and entrepreneurship projects and local industry needs is not precise, leading to a low transformation rate; there is a lack of specialized transformation platforms and financial support, with most competition achievements remaining active during the competition stage but difficult to transform sustainably after the competition. How to open up the full chain of "creativity-innovation-entrepreneurship" remains a pressing issue to be addressed.

3. Construction of "Three-Dimensional, Four-System, Five-Oriented" Innovation and Entrepreneurship Education System

Based on the above issues, this study proposes a "three-dimensional, four-system, five-transformation" innovation and entrepreneurship education system. This system is guided by three major principles: "industry-education integration, ability orientation, and regional service". Through the collaborative efforts of four subsystems: teaching mode, curriculum system, resource allocation, and efficiency evaluation, it ultimately achieves the development goals of specialization, integration, platformization, ecologicalization, and sustainability.

3.1 Three-Dimensional Driven Education Mode

The three-dimensional drive model of "industry demand-student development-resource integration" aims to solve the current problem of the disconnection between education and practice[6]. Firstly, on the industry demand side, a "dual-chain docking" professional dynamic adjustment mechanism is established, focusing on building four major professional clusters around the local industrial system: intelligent information, intelligent manufacturing, intelligent construction, and new materials. The "three early plans" are implemented, namely early entry into topics (participation in teacher horizontal projects in freshman year), early entry into teams (joining research teams in sophomore year), and early entry into

laboratories (leading experimental design in junior year), to strengthen the cultivation of industrial practical abilities. Secondly, on the student development side, a progressive training path of "interest-ability-achievement" is constructed, achieving personalized training through "learning communities + small and micro organizations". For example, the School of Information Engineering relies on provincial science popularization bases and discipline platforms to form interdisciplinary small and micro learning organizations, stimulating students' interest in innovation and entrepreneurship through the four-step method of observation, listening, teaching, and practice. The innovation and entrepreneurship street implements a "strict selection for entry" mechanism, requiring projects to pass through four stages of application, roadshow, review, and signing to ensure precise resource matching. Thirdly, on the resource integration side, a "campus + off-campus" dual-cycle resource ecosystem is created. Internally, a digital maker space is built, integrating discipline, talent, and technology resources; externally, a virtual cooperation platform is established, integrating policy, market, and industry resources. The collaboration between "schools, governments, industries, and enterprises" is deepened to jointly build new benchmarks for industry-education integration, cutting-edge scenarios, and model innovation.

3.2 Five-Creation Integration Curriculum System

Reconstruct the three-level curriculum system of "general education + major + practice" to achieve deep integration of thinking and innovation, major and innovation, science and innovation, competition and innovation, and industry and innovation. First, in terms of thinking and innovation integration, it is necessary to emphasize ideological and political education as the guide, integrate ideological and political education throughout the entire process of innovative talent cultivation, and guide students to establish a value orientation of "innovation for national development and social progress". Embed social responsibility, national sentiment, and other ideological and political requirements in the setting of teaching objectives, and integrate ideological and political elements such as major heavy equipment and youth entrepreneurship models

into case teaching. Second, in terms of major and innovation integration, it is important to focus on the foundation of majors, transform core knowledge points of majors into innovative tasks through curriculum reconstruction, such as the "Commercial Law" course in the credit risk management and legal prevention and control major, which aims to carry out case innovation analysis with the goal of "legal risk prevention under new business forms". Promote the construction of a "double-teacher" team through teacher collaboration, invite technical backbone of enterprises to participate in professional course teaching. Incorporate innovation achievements into professional course assessment through assessment reform, replacing some written exam scores with innovative design schemes and professional field research reports. Third, in terms of science and innovation integration, it is necessary to focus on technology as the engine, integrate cutting-edge technology content such as artificial intelligence, big data, and the Internet of Things into professional courses, build platforms such as science and innovation laboratories and maker spaces, encourage students to participate in teacher research projects, especially industry-university-research cooperation projects. Fourth, in terms of competition and innovation integration, it is necessary to take competitions as a starting point, offer a series of courses on practical guidance for competitions, build a tiered competition training system, integrate mentor resources inside and outside the school, and set up a special fund for competitions to support excellent projects. Fifth, in terms of industry and innovation integration, it is necessary to be industry-oriented, establish industrial innovation alliances with industry enterprises, transform enterprise technical problems into innovative topics and practical projects, jointly build practice bases and incubation bases, build a platform for industry and innovation docking, and promote the docking of innovative projects and enterprise resources.

3.3 Diversified Resource Allocation System

In terms of resource docking platforms, by integrating multiple parties such as the government, enterprises, universities and research institutes, financial institutions, and service agencies, resource barriers are broken and a collaborative mechanism is established to

achieve resource centralization and sharing. Firstly, establish a resource docking platform. Led by the government or entrusted to professional institutions for operation, it creates an "innovation and entrepreneurship resource pool" that integrates online and offline resources. Integrate school laboratory equipment and technical patents, enterprise industrial chain needs, idle industrial park space, etc., to achieve information disclosure, precise matching, and avoid resource duplication and waste. Secondly, build a full-chain transformation system. Build a "demand-driven" R&D collaboration mechanism, promote enterprises to deeply participate in the early stages of school research and development, set research topics based on enterprise market demand and industry pain points, ensure that research and development results are "down-to-earth", and reduce transformation risks from the source. For example, schools and enterprises jointly build laboratories and invest in research and development resources. Strengthen the collaborative support of the "pilot test link", jointly build "pilot test bases" or "concept verification centers" with the government, enterprises, and investment institutions to provide services such as small batch production, performance testing, and market verification for laboratory results. Make up for the shortcomings of start-up teams in pilot test equipment, technology, and funds, and open up the key node of "the last mile" in the transformation of results. Improve the "commercialization" collaborative service system, integrate financial, legal, intellectual property, management consulting and other service agencies, provide "one-stop" services such as patent layout, financing docking (angel investment, venture capital fund), business model design, team building, etc., for scientific research results, and help technological achievements quickly enter the market. Thirdly, build a "multi-dimensional collaboration" security system. Establish a cross-subject coordination organization, set up a "innovation and entrepreneurship collaboration alliance" or "consultation and coordination mechanism" composed of relevant government departments, core enterprises, and school representatives, regularly communicate and solve bottlenecks in resource docking and results transformation, and break down communication barriers between departments and subjects. Schools and

enterprises jointly form an interdisciplinary and cross-field innovation and entrepreneurship mentor team to provide comprehensive guidance for students' innovation and entrepreneurship projects and practical activities. The mentor team is usually composed of full-time and part-time teachers, industry experts, and other forces, which can provide customized and phased guidance according to the specific characteristics and development needs of student projects. For example, in the process of promoting innovation and entrepreneurship projects, experts with technical backgrounds can assist in research and development breakthroughs, mentors who are good at market direction can guide the formulation of promotion strategies, and experts in the financial field can provide professional support in fund management and financing planning. Through the collaborative guidance of the mentor team, improve the quality and success rate of students' innovation and entrepreneurship projects. Improve incentive and evaluation mechanisms, give preferential treatment to scientific research teams that actively participate in resource sharing and results transformation in terms of scientific research funding, professional title evaluation, etc; For enterprises with outstanding contributions, incentives such as tax incentives and policy subsidies will be provided to stimulate the enthusiasm of all parties for collaboration. A digital collaboration base will be established, utilizing big data, artificial intelligence, and other technologies to upgrade the resource matching platform, achieve intelligent matching of demand and resources, and digital tracking and management of the entire process of achievement transformation, thereby improving collaboration efficiency.

3.4 CIPP Four-Dimensional Evaluation System

The introduction of the CIPP model establishes a four-dimensional evaluation system, including background evaluation, input evaluation, process evaluation, and outcome evaluation. Background evaluation focuses on the early foundation and external environment of system construction; input evaluation focuses on resource input; process evaluation focuses on the system operation process; and outcome evaluation focuses on final output and comprehensive benefits. Through the AI

learning analysis platform, process data is collected, and the four-subject evaluation method is used to strengthen process evaluation. A "evaluation-feedback-improvement" closed-loop system is established, and an annual innovation and entrepreneurship education quality report is released to guide resource allocation and curriculum optimization. First, in terms of input evaluation, it focuses on the resource input and configuration efficiency required to support the operation of the system, covering key elements such as hardware facilities, faculty, and funding input. This dimension mainly uses quantifiable indicators such as average student practice area, proportion of enterprise mentors, and proportion of special funds for innovation and entrepreneurship to evaluate the adequacy and rationality of resource allocation. Relevant data is obtained from the school's unified data platform, faculty management database, and financial system, and objective evaluation is achieved through resource auditing and efficiency analysis. Second, the process evaluation dimension focuses on the implementation quality and participation level in system operation, with a focus on the standardized implementation and substantive effectiveness of educational activities. It relies on indicators such as project practice duration, coverage of small and micro organizations, and the number of school-enterprise cooperation projects to continuously monitor teaching process, resource use, and system implementation. Relevant data comes from learning logs, platform dynamic records, project archives, and other original materials, and is evaluated using a combination of process observation and data tracking methods. Third, the outcome evaluation dimension focuses on the final output and overall benefits of the system, with a focus on student ability growth and actual transformation of results. This dimension measures the actual effect and value creation of innovation and entrepreneurship education through indicators such as patent and competition award growth rate, entrepreneurial project survival rate, and graduate entrepreneurial proportion. Data comes from outcome statistical reports, tracking survey data, and third-party evaluation reports, and is evaluated using performance analysis and impact assessment methods. Fourth, during the implementation process, multi-source data

collection and integration are carried out relying on the AI learning analysis platform, and a "four-subject evaluation" mechanism is established. That is, enterprise mentors focus on evaluating students' practical application ability and professional quality, while in-school teachers mainly evaluate professional knowledge mastery and innovation ability. Students reflect their growth and participation experience through self-evaluation and mutual evaluation, and the platform system automatically records and analyzes learning behavior data. A systematic and multi-perspective comprehensive evaluation is carried out by combining qualitative analysis and quantitative evaluation. The evaluation results are embedded in the "evaluation-feedback-improvement" closed-loop mechanism, and an annual innovation and entrepreneurship education quality report is regularly compiled and released to provide solid data support and decision-making reference for system iteration and improvement. The evaluation results are practically applied to the optimization and dynamic adjustment of disciplines, the updating of course content and teaching resources, and the improvement of resource allocation efficiency. Through the improvement of performance-related incentive measures, the dual-innovation education system is continuously optimized and quality enhanced. The evaluation system achieves full process coverage from goal setting to result application through the organic connection and mutual support of four dimensions, promoting the transformation of innovation and entrepreneurship education from experience-driven to data-driven, and from terminal assessment to process optimization, thus ensuring the scientificity, effectiveness, and sustainability of the innovation and entrepreneurship education system.

4. Implementation Path of Innovation and Entrepreneurship Education System in Application-Oriented Local Universities

The systematic implementation of the innovation and entrepreneurship education system in application-oriented local universities is a strategic project related to the deep integration of higher education reform and regional innovation development[7]. This system, with the overall framework of "three dimensions, four systems, and five

transformations," aims to break through structural difficulties such as isolated platforms, cognitive biases, disconnected courses, and difficulties in transforming achievements in traditional innovation and entrepreneurship education. It is committed to building a new educational ecosystem driven by industry needs, centered on student development, and supported by resource integration. Its implementation requires not only clear phased goals and promotion strategies but also relies on multi-dimensional guarantee mechanisms to form a systematic operation mode that can be closed-loop managed and continuously optimized, thus realizing a deep transformation from "single-point innovation" to "system reconstruction" and from "scale expansion" to "quality empowerment"[8-10].

4.1 Three-Stage Implementation Path with Progressive Layers

The system implementation follows an evolutionary logic of "from the inside out, from mechanism to ecology," and can be divided into three organically connected development stages. The near term (2025-2026) is the "mechanism construction and foundation consolidation stage," focusing on cultivating endogenous driving forces within the system. This stage includes key points such as systematically revising talent training programs, ensuring that the proportion of specialized and innovative integration courses in the professional system is not less than 25%, establishing compulsory credits and flexible recognition mechanisms for innovation and entrepreneurship; promoting the construction of physical platforms for college-specific innovation and entrepreneurship spaces, establishing more than 20 innovation and entrepreneurship studios covering types such as scientific research and development, cultural creativity, business services, agriculture and rural revitalization, and social welfare, with the average practice area per student increased to over 0.8 m², and simultaneously building virtual simulation and project collaborative management platforms; establishing a teacher innovation and entrepreneurship performance point system, incorporating course development, competition guidance, and project transformation into professional title evaluation and performance assessment, implementing enterprise rotation training programs, and enhancing the practical ability of teachers. The

medium term (2027-2028) is the "mode promotion and brand shaping stage," focusing on promoting the outward extension and integration of mature mechanisms. Systematically summarize the co-construction mode and implementation path of industry colleges, formulate standardized curriculum development norms, teacher team construction plans, and quality evaluation mechanisms for school-enterprise collaboration that have promotional value, and promote the establishment of two national-level modern industry colleges. Closely align with regional development strategic layouts, focus on key areas such as "rural revitalization" and "intelligent manufacturing," build characteristic project clusters, actively apply for Ministry of Education industry-university cooperation collaborative education projects, and effectively enhance the contribution and influence of higher education to local economic and social development. Relying on the main role of the school, jointly establish a regional innovation and entrepreneurship education alliance with government departments, industrial parks, financial institutions, and research institutions, systematically building a new innovative ecological network with diverse participants including "government, industry, academia, research, and finance." The long term (2029-2030) is the "ecology formation and system output stage," focusing on system maturity and social radiation. Comprehensively build a full-chain ecology that integrates "education-incubation-industry," promoting the continuous transformation of innovation achievements; summarize and form a standard toolkit for innovation and entrepreneurship education including course modules, mentor manuals, and quality evaluation guidelines, and export it through inter-school cooperation, assistance to the central and western regions, international projects, and other channels; explore the establishment of "the Belt and Road" innovation and entrepreneurship education centers or overseas school-enterprise joint bases, realizing the standard diffusion and capability spillover of the system.

4.2 Multi-Dimensional Guarantee Mechanism Supported by the System

To ensure the effective implementation and dynamic optimization of the implementation path, a systematic and institutionalized

guarantee mechanism needs to be established. At the policy guarantee level, a school-level "Outline for the Construction of Innovation and Entrepreneurship Education System" should be formulated to clarify the core position of innovation and entrepreneurship education in the development of application-oriented universities. A cross-departmental joint decision-making mechanism should be established to coordinate policy support from various departments such as academic affairs, student work, scientific research, and personnel. Measures for course recognition, appointment of enterprise mentors, student innovation and entrepreneurship scholarships, and incubation fund management should be introduced to form a system of mutual recognition and interconnection among teaching, practice, and incubation activities. At the resource guarantee level, a diversified funding channel consisting of "financial investment + enterprise sponsorship + social donation + performance incentives" should be established, and a special fund for innovation and entrepreneurship should be set up with project-based budget management implemented. The integration of "physical-virtual-industrial" three spaces should be promoted, and functional composite maker spaces and cross-disciplinary experimental platforms should be built, embedding real production scenarios and technical processes of enterprises to achieve open sharing and efficient allocation of resources. At the governance guarantee level, a working committee for innovation and entrepreneurship education led by school leaders, coordinated by multiple departments, and participated by enterprise representatives should be established. A closed-loop management mechanism of "annual evaluation-dynamic adjustment-quality report" should be established. An information system for innovation and entrepreneurship education management should be developed to achieve digital governance of projects, mentors, courses, venues, and other elements. Tools such as the CIPP model and value-added evaluation should be introduced to carry out system effectiveness evaluation and form a continuous improvement institutionalized channel.

4.3 System Integration of Implementation Path and Guarantee Mechanism

The implementation path and multi-dimensional guarantee mechanism of the three stages are not

isolated from each other, but an organic whole that is nested and dynamically adjusted. The stage objectives provide guidance for the guarantee mechanism, and the guarantee mechanism provides support for the advancement of the stage. In the near stage, policy and resource guarantees focus on serving internal mechanisms and basic condition construction; in the medium stage, governance guarantees are needed to promote cross-organizational collaboration and resource integration; in the long-term stage, it relies more on institutional innovation and system output capacity to promote dual innovation education from "internal practice" to "social ecology". Only by achieving systematic integration of paths and mechanisms in time sequence, structure, and function can we truly achieve the development goal of "professionalization, integration, platformization, ecologicalization, and sustainability" of dual innovation education in application-oriented universities.

5. Conclusion

By constructing a "three-dimensional, four-system, five-oriented" innovation and entrepreneurship education system, S College not only provides support for its own construction of a high-level application-oriented university, but also provides a reproducible and scalable practical paradigm for similar universities. This system focuses on industry-education integration, multi-party collaboration, and continuous improvement, and has important theoretical innovation and practical application value in promoting the reform of innovation and entrepreneurship education in application-oriented universities and enhancing regional service capabilities. In the future, we will further explore dynamic adjustment mechanisms, deep industry-education integration, and international comparative research, and continue to improve the innovation and entrepreneurship education system of application-oriented universities with local characteristics.

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