Occupation and Professional Education Vol. 1 No. 8, 2024

Practice Research on Cultivation of Innovative Talents in Landscape Architecture Specialty under the Background of New Agricultural Science: Take Suqian University as an Example

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Abstract: Under the background of new agricultural science, Landscape architecture major of Suqian University has distinct regional characteristics in personnel training, teaching, scientific research, social services, rural revitalization and other aspects, and is a base for local landscape talents training. Over the years, it has carried out a lot of exploratory work in the cultivation mode of innovative and entrepreneurial talents, practical teaching reform and other aspects, and has accumulated rich experience. This research takes the leadership of originality, school-enterprise linkage, integration of science and education, innovation and entrepreneurship as the practical direction of talent training. According to the development needs of garden industry and closely combined with the economic and social development needs of northern Jiangsu Province, this research aims to build a major with obvious local characteristics and advantages to serve the social and economic construction of northern Jiangsu Province. It will play a demonstration and driving role in the construction and reform of related majors in agricultural and forestry colleges in northern Jiangsu.

Keyword: New agricultural science; Major in landscape architecture; Application-oriented; Personnel training; Practical research

1. Introduction

1.1 Research Background

The New Agricultural Sciences initiative is dedicated to fortifying and revitalizing agriculture, centering on green ecological industries. It aims to modernize traditional agricultural and forestry disciplines through biotechnological advancements, augment practical teaching platforms through diverse pathways, and foster an innovative collaboration between science and education The landscape industry, a part of the green ecological sector, is renowned as “a perpetual sunrise industry”, contributing significantly to the nation's economic and social development, as well as environmental conservation. Its role in sustainable national development and the establishment of an ecological civilization is pivotal. Within the paradigm of the New Agricultural Sciences, the horticulture program at Suqian University showcases distinct regional characteristics in talent cultivation, teaching methodologies, research endeavors, societal contributions, and rural revitalization efforts. Over the years, it has emerged as the primary hub for nurturing horticultural talents in the Suqian region, conducting extensive research on practical teaching reforms and innovative approaches to cultivating entrepreneurial talents, thereby accumulating a wealth of experiences [1, 2]. Aligned with the burgeoning demands of the horticultural industry, the program endeavors to cultivate highly skilled, application-oriented, and innovative horticultural professionals. Its ambition is to position the Horticulture program at Suqian University as a prominent hub for elite talents in the landscape industry development in northern Jiangsu. Rooted in a comprehensive approach to talent cultivation emphasizing craftsmanship, collaborative efforts between academic institutions and enterprises, the fusion of scientific knowledge with education, as well as fostering innovation and entrepreneurship, the program closely intertwines with the economic and social development needs of northern Jiangsu. It eschews grandiosity and conformity, choosing instead to anchor itself in its unique attributes. In tandem with the requisites of

horticultural industry development and the socio-economic needs of northern Jiangsu, the program aspires to establish a specialized curriculum distinguished by its pronounced local characteristics and strengths. Through this initiative, it aims to better serve the socio-economic fabric of northern Jiangsu and play an influential role as a model and catalyst in the construction and reform of similar programs at peer institutions.

1.2 Existing Issues

In traditional horticultural education, the emphasis has predominantly been on theoretical knowledge and practical training as linchpins for talent development. However, there has been insufficient attention given to nurturing students' moral values, professional craftsmanship, and ethical perspectives. Hence, to instill the spirit of craftsmanship in horticultural education, it is imperative to redefine talent cultivation and holistic education objectives to elevate the humanistic spirit, innovative capabilities, correct values, and noble moral qualities of horticultural professionals. Only through this transformation can students internalize the knowledge they acquire and manifest it in their actions [3].

Historically, the depth of collaboration between educational institutions and enterprises has been lacking substantial substance [4]. Presently, both academia and industry co-create talent development strategies, develop curricula, textbooks, platforms, and jointly implement teaching methodologies. This collaborative effort effectively enhances students' problem-solving abilities and technical skills, stimulates their interest and creativity in learning, and significantly elevates the quality of applied talent cultivation.

The disconnect between research and teaching is detrimental to the construction of knowledge frameworks in the curriculum, practical teaching by faculty, and students' practical, innovative, and application abilities, as well as their overall enhancement [5].

In traditional pedagogy, the proportion of innovation and entrepreneurship education has been relatively scant, receiving inadequate emphasis. Oftentimes, only minimal theoretical instruction is provided, with a singular teaching approach, lacking practical applications, and possessing vague objectives. Additionally, there is a shortage of qualified faculty, resulting in minimal outcomes [6]. By integrating innovation and entrepreneurship education throughout the entire talent development process, students' abilities in innovation and entrepreneurship have shown marked improvement, yielding significant results.

2. Cultivating Innovative Talent in Horticultural Education within the Context of New Agricultural Sciences

The establishment of New Agricultural Sciences takes on the responsibility of promoting and revitalizing agriculture, emphasizing diverse practical teaching methods, and fostering a collaborative mechanism that innovatively combines science and education to cultivate individuals [7]. Addressing issues such as the lack of craftsmanship spirit among horticultural talents and the insufficient alignment of quality applied talent cultivation with industry development needs, this research, guided by an outcome-oriented approach, aims to cultivate horticultural craftsmanship talents. This is achieved through measures such as optimizing talent cultivation models and curriculum structures, implementing school-enterprise partnerships that integrate academia, industry, and research, and fostering a coordinated approach merging science and education to nurture innovation and entrepreneurship talents. The specific strategies are outlined as follows:

2.1 Guided by Craftsmanship Spirit - Constructing a talent cultivation system imbued with the spirit of horticultural craftsmanship

Adhering to the cultivation of moral virtues, the craftsmanship spirit is interwoven into talent cultivation, promoting pure craftsmanship, scholarly craftsmanship knowledge, technical craftsmanship, and creative craftsmanship skills. A professional teaching advisory committee comprising industry representatives, enterprise delegates, and internal and external experts is established to set forth the "Four Ones" craftsmanship talent cultivation objectives: a dedication to their craft, a set of design plans, a miniature garden, and a well-received accolade. These objectives are further detailed and disseminated into specific competency indicators, forming the horticultural craftsmanship talent competency index system that underpins the "Four Ones" goals, offering real-time reinforcement and dynamic refinement. Developing a curriculum system for horticultural

craftsmanship talents involves tailoring three categories of courses (professional foundational courses, professional core courses, and professional practical courses), progressively imparting knowledge. The design of professional core courses encompasses three types of positional courses (landscaping design, engineering construction, green construction), systematically sustaining the competency index system.

2.2 School-Enterprise Partnerships - Deepening the cooperative talent cultivation model by enhancing school-enterprise partnerships

Through collaborations between schools and enterprises, a talent cultivation process guided by enhancing practical abilities is established. This initiative aligns the professional chain with the industry chain, synchronizes course content with industry standards, connects teaching processes with production processes, and integrates talent cultivation with industrial demands [8]. This collaboration refines the application-oriented talent cultivation model, intertwining school-enterprise production and education deeply, while fostering multifaceted collaborative talent development.

(1) Establishing industry colleges in collaboration with enterprises to facilitate profound integration of academia and industry

Pooling resources with enterprises to establish the "Suhua Institute" aims to meet the needs of industrial and regional economic and social development, focusing on cultivating application-oriented talents. It involves linking with local horticultural floral industry chains to organically blend talent cultivation, faculty development, practical training, internships, innovation and entrepreneurship, and technological innovation. By constructing a deep collaboration model between schools and enterprises and fostering coordinated talent development, a genuine physical innovative training platform is crafted to encapsulate multiple functions that encompass production, learning, research, transformation, innovation, and application, as is shown in Figure1.

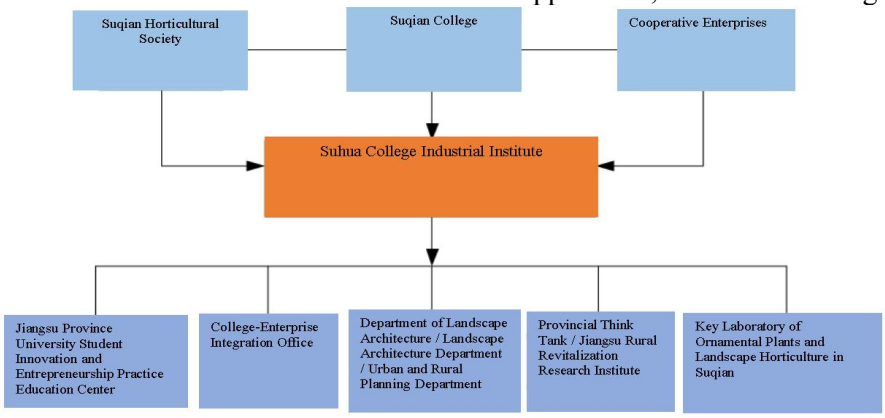

Figure 1. Organizational Structure of the Landscape Architecture Professional-Industry Integration

(2) Leveraging the distinctive features of local floral and arboreal industries by establishing educational partnerships with multiple enterprises

Leveraging the natural advantages of the "hometown of floriculture", Suzhou, collaborations have been established with numerous local horticultural enterprises through the signing of agreements for practical teaching bases. Enterprises engage in hiring enterprise mentors and part-time professors, participating in developing talent cultivation plans, co-creating industry-oriented courses, educational materials, and platforms. Collaboratively applying for educational and research projects, students are involved in real engineering projects, taking on tasks beyond theoretical courses to encompass course design (internships), production internships, final internships, and thesis projects. Collaborative ventures with enterprises facilitate immersive, practical, hands-on, on-site teaching experiences.

2.3 Integration of Science and Education - Advancing a Talent Cultivation Mechanism Through the Synchronized Integration of Science and Education

By merging practical applications, specialized research teams with defined research directions are established. Faculty members integrate real-world research outcomes from frontline production into teaching content and thesis

topics, enriching teaching practices and swiftly embedding them into course instruction and professional development. This significantly enhances students' adaptability to future employment roles, effectively bridging the gap between industry demands and theoretical knowledge structures, thereby driving a collaborative science-teaching mechanism.

(1) Leveraging research teams and platforms to enhance theoretical curriculum systems

Establishing research teams with clear-cut directions and leveraging municipal research platforms, scientific research findings are integrated into the professional curriculum framework. Strengthening foundational subject courses within the scope of national standards, the training program facilitates student participation in faculty research projects, enabling teachers to enrich teaching methods through the application of research outcomes and laying a solid foundation for cultivating high-caliber applied talents.

(2) 89 Improving practical teaching systems based on the advantages of scientific research

When structuring practical elements in the curriculum, teachers combine activities such as scientific research and other social service projects to effectively hone students' abilities in comprehensive problem analysis, practical skills, problem identification and resolution, as well as innovation and entrepreneurship. This approach enhances students' learning interests and augments their adaptability to future professional roles.

2.4 Innovation and Entrepreneurship - Strengthening the Talent Cultivation System for Student Innovation and Entrepreneurship

Incorporating visible innovation and entrepreneurship courses into talent cultivation plans, students are equipped with mentors in innovation and entrepreneurship. Basic awareness in innovation and entrepreneurship is instilled in lower grades, while higher levels focus on fostering innovation and entrepreneurial capabilities. Innovation and entrepreneurship education is integrated into assessment criteria, with innovation credits established to fortify students' accumulation of various academic competition certificates, job placement readiness, and entrepreneurial preparation.

(1) Reforming the curriculum structure by integrating innovation and entrepreneurship education throughout the entire student development process

Advancing school-wide innovation and entrepreneurship education initiatives involves reforming talent cultivation models and curriculum structures to seamlessly integrate innovation and entrepreneurship education throughout the entire student development trajectory [9]. Lower-grade courses introduce the fundamentals of innovation and entrepreneurship, as well as career planning for university students, while also providing mentorship in this field. Higher-grade levels emphasize nurturing innovation and entrepreneurship competencies through courses on employment guidance, cutting-edge disciplines, student innovation practices, and entrepreneurial training. Through a blend of innovation and entrepreneurship training, various related projects, and academic competitions, students' knowledge in innovation and entrepreneurship is expanded to develop sufficient innovation and entrepreneurial capabilities, culminating in a holistic preparation for future job placements and entrepreneurship endeavors.

(2) Introducing innovation credits to incorporate innovation and entrepreneurship education into talent development assessment processes.

During their academic tenure, students, through pertinent innovation and entrepreneurship platforms (located within the school's entrepreneurial district), establish innovation and entrepreneurship teams (Yilu Shenghua Innovation and Entrepreneurship Team). Upon devising talent cultivation programs, innovation and entrepreneurship courses are structured, with reasonable credit hours assigned. Students must complete specified innovative learning contents and achieve relevant entrepreneurial outcomes as stipulated in the plan. Upon the department's recognition of their proficiency, students earn a specified number of credits for graduation.

3. Research Innovations

3.1 Reforming Teaching Practices - Craftsmanship Leadership, Industry-Education Integration, and Enhancing Talent Development Quality

(1) Establishing a "Craftsman-style" Talent Cultivation System

Addressing deficiencies in the spirit of craftsmanship among horticultural talents and the suboptimal alignment between talent

development quality and industrial growth demands, guided by the OBE philosophy, a set of "Four Ones" objectives for cultivating craftsman-style talents has been formulated. This initiative includes constructing criteria for the capabilities of horticultural craftsman-type talents and a curriculum structure integrating the essence of craftsmanship throughout the entire talent cultivation process, thereby elevating the quality of nurturing talents with finesse.

(2) Implementing a "School-Enterprise" Collaborative Teaching Model

Rooted in the fundamental task of cultivating virtues and centered on enhancing talent development capabilities, guided by the needs of industrial, regional economic, and social development, the proactive service aligns with the new demands of economic and social progress in Suqian City. Deep cooperative efforts are undertaken in talent cultivation and technological research and development in the horticultural industry, facilitating close coordination between talent development supply and the demands of the industrial and innovation chains. This enhances the collaborative mechanisms for talent cultivation, strengthens academic-industry cooperation for educating and nurturing individuals, and boosts the quality of applied talent cultivation.

3.2 Establishing Competitive Mechanisms - Research Practices, Innovation, and Entrepreneurship to Enhance Student Competitiveness

(1) Utilizing "Research Practices" as a Platform

Within the professional development framework, the integration of research and teaching practices, where research informs teaching, seamlessly connects professional education with industry demands. Faculty actively engage in external services, strive to secure research projects, and consistently provide abundant opportunities for students to engage in research practices. By externally recruiting executives from enterprises as innovation and entrepreneurship mentors, the fusion of academia with industry and research is fortified. This reinforcement enhances students' innovative skill sets, broadens their horizons, and augments the competitiveness and entrepreneurial prowess of graduates in the job market.

(2) Using "Innovation and Entrepreneurship" as Leverage

We have integrated innovation and entrepreneurship education throughout the entire talent cultivation process, systematically reforming talent development models and curriculum structures by incorporating innovation credits. Organizing students to actively participate in university innovation and entrepreneurship projects and various other entrepreneurial activities, including contests like "Internet+" and "Challenge Cup," as well as academic competitions such as "Youth Innovation" and others, has significantly improved students' competitive edge and nurtured their innovation capabilities.

4. Conclusions and Application of Achievements

The focal point of our discipline lies in the cultivation of moral virtues and the promotion of collaborative education between academic institutions and industries. Emphasizing the integration of scientific education, innovation, entrepreneurship, and aligning talent development with regional economic growth has yielded substantial practical results.

4.1 Enhancement in Talent Development Quality

(1) Advancing Professional Application Abilities

In recent years, there has been a notable increase in the number of students winning awards in various provincial-level competitions. Engaging in skill training, certification exams such as intermediate CAD certificates and engineering surveyor certificates; students actively engage in teacher-led research projects, teachers collaborate on industry-academic research projects, making progress in deepening the integration of industry and education, and reciprocating research and teaching. Students' innovative and practical skills have greatly improved.

(2) Improving Employability Skills

Through tracking surveys of over 100 horticultural enterprises, our graduates have demonstrated strong overall competitiveness, high professional competence, swift adaptability to work environments, and exemplary professional ethics. Many graduates have evolved into technical pillars within their organizations. Enterprises actively seek our students for employment and internships, leading to an impressive employment rate of over 90%.

(3) Enhancing Self-Learning Abilities

There has been a marked improvement in students' self-directed learning abilities. In recent years, students have been awarded numerous provincial-level innovative projects; the participation in innovation and entrepreneurship competitions such as "Internet Plus", "Challenge Cup", and China National Undergraduate "Innovation, Creativity and Entrepreneurship" Challenge has been progressively increasing each year, leading to a noticeable rise in the rate of awards received. The quantity and quality of students' academic papers, authorized patents, and software copyrights have demonstrated substantial achievements. Over the past three years, the pass rate for the College English Test Band 4 is close to 100%, while Band 6 is about 40%; the average admission rate for postgraduate studies is nearly 50%, with some students being admitted to prestigious universities under the 985 and 211 projects. Despite entering the university with the lowest scores, students consistently rank first in high-quality education and research accomplishments. The graduation rate and degree award rate have both exceeded 98% and 95% respectively; students have also excelled in passing civil service exams, securing official positions, and serving as village officials. Their outstanding performance has significantly contributed to the establishment of the school's "Three Excellence" brand.

4.2 Strengthening Teacher Team Development

(1) Effective Talent Recruitment and Development

In recent years, several Ph.D. scholars have been recruited, teachers have been selected to pursue doctoral degrees, and many have embarked on temporary assignments in relevant landscaping enterprises and institutions to gain practical experience. In the realm of talent development, there has been a notable increase in the number of individuals participating in talent cultivation programs such as the Provincial Mass Entrepreneurship and Innovation Doctoral Program, the Provincial Deputy Director of Science and Technology, the Provincial "333 High-Level Talent Cultivation Project", and outstanding young core teachers in the Provincial University "Green and Blue Project".

(2) Enriched Collaborative Achievements in Teaching and Research

In the realm of teaching and research, professionals have demonstrated remarkable progress in recent years. They have actively engaged in provincial teaching competitions, micro-course competitions, "Internet Plus" competitions, the Challenge Cup, and CAD competitions. Furthermore, their increased involvement in guiding students to success in competitions at provincial and higher levels is evident. Moreover, their endeavors have borne fruit in securing approval for provincial-level educational reform projects, the development of top-notch curricula, advancements in textbook construction, and substantial contributions through the publication of educational research papers. When it comes to scientific research, teachers have taken on provincial-level and higher research projects, as well as horizontal projects. Noteworthy accomplishments include securing research funding, publishing research papers, and obtaining patents for their inventions. These achievements, characterized by both quantity and quality, represent a considerable leap forward from the achievements of the past.

4.3 Enhancing Social Service Capabilities

Leveraging their expertise in professional technologies and fostering collaboration between academia and industry, teachers have led students in cutting-edge research on new varieties of high-end flowers and large-scale breeding. This initiative has made significant strides in deepening the integration of production and education, as well as in the reciprocal enhancement of teaching through research, garnering recognition through public reports on the platform "Xuexi Qiangguo". Additionally, they have addressed crucial technical issues in the development of the succulent industry in local townships, earning coverage in multiple national media reports. To enhance their ability to contribute to the local economy, they have engaged in collaborative production and sales activities with enterprises in the form of "university + enterprise + base". This approach facilitates the effective transformation of research outcomes, leverages regional advantages in the horticultural industry, and consistently boosts the economic performance and innovative capacity of enterprises.

Acknowledgments

This work was financially supported by the Suqian Women's Federation Women's

Entrepreneurship and Innovation Launch Plan Project (Project Number: Heng2023141), and the Tenth Batch of Teaching Reform Research Projects at Suqian University (SQU2023JGYB10).

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