Cultivating for New-Quality Productive Forces: Research on the Core Competency Composition and Practical Training Path for University Students' Innovation and Entrepreneurship

——An Empirical Analysis Based on Case Studies

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Abstract. The development of new-quality productive forces (NQPFs) has put forward brand-new requirements for university students' innovation and entrepreneurship capabilities. This study aims to construct a core competency model oriented towards NQPFs and design a practical training path. Through literature analysis and multi-case empirical research, it is proposed that the core innovation and entrepreneurship competencies of university students should consist of five dimensions: value insight and definition, innovative thinking and problem-solving, technical implementation and integration, team leadership and resource integration, and entrepreneurial action and risk response. On this basis, the study designs a spiral, three-stage practical training path: "Basic Cognition & Project Simulation – Interdisciplinary Integration & Prototype Incubation– Market Verification & Enterprise Acceleration," elaborating on the key tasks and supporting mechanisms for each stage. Case validation shows that this model and path can effectively and systematically enhance students' ability to respond to industrial transformation and conduct original innovation, providing a theoretical basis and a practical plan for universities to deepen the reform of innovation and entrepreneurship education and precisely empower the development of NQPFs.

Keywords: New-Quality Productive Forces; Core Innovation and Entrepreneurship Competencies; Competency Composition Model; Practical Training Path; Case Study

1 Introduction

The year 2025 marks a critical juncture, concluding the "14th Five-Year Plan" and laying the groundwork for the "15th Five-Year Plan." Developing NQPFs to drive high-quality development has become a national core strategy. The defining characteristic of NQPFs is innovation, encompassing technological and business model innovation,

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as well as management and institutional innovation [1]. University students, as the most dynamic group within the national innovation system, are key agents whose innovation and entrepreneurship capabilities are crucial for catalyzing NQPFs. However, current university innovation and entrepreneurship education often suffers from disconnection from practice and fragmented competency development, failing to meet the forward-looking, interdisciplinary, and practical demands of NQPFs for talent. Although scholars domestically and internationally have produced abundant research on educational models and practice platform construction, studies that systematically build a NQPF-oriented core competency model and accordingly design a closed-loop practical training path remain insufficient. This research aims to fill this gap by constructing a multi-dimensional core competency model and designing a spiraling practical training path, providing a theoretical framework and practical guide for universities to deepen innovation and entrepreneurship education reform in the new development stage and precisely empower NQPFs.

2 The Connotation of NQPFs and the Shift in Guidance for University Students' Innovation and Entrepreneurship Competencies

2.1 Core Characteristics of NQPFs and Talent Requirements

NQPFs are catalyzed by revolutionary technological breakthroughs, innovative allocation of production factors, and deep industrial transformation and upgrading. Their core characteristics include high-tech drivenness (e.g., deep integration of AI, biotechnology), high-efficiency factor allocation (emphasizing optimal combination of data and traditional factors), and high-quality output (pursuing sustainable economic development and competitiveness). Education is not like building machines or houses for immediate results; it involves developing the potential of the educated, equipping them with the knowledge, skills, and creativity needed for future survival and development [2]. This productive force paradigm requires innovation and entrepreneurship talent to possess prospective technological insight, interdisciplinary knowledge integration capability, innovative capacity for solving complex real-world problems, and the execution power to rapidly transform ideas into market value.

2.2 Limitations of Traditional Competency Models and the Necessity for a Shift

The emergence of new quality productivity is driven by revolutionary technological breakthroughs, innovative allocation of production factors, and deep industrial transformation and upgrading. Its core feature is the high-tech driving force, such as the deep integration of cutting-edge technologies such as artificial intelligence and biotechnology; The high efficiency of element configuration emphasizes the optimized combination of new elements such as data with traditional elements; And the high quality of

output, pursuing the sustainability and competitiveness of economic development. Education is not as immediate as building machines and houses, but rather by developing the potential of learners, equipping them with the knowledge, skills, and creativity necessary for future survival and development[3]. Traditional training models frequently focus on singular skills like business plan writing or marketing techniques, or remain at the level of generalized discussions on generic innovation capabilities. Such models struggle to cope with rapid technological iteration and blurred industrial boundaries, creating a "chasm" between student capabilities and real industry needs. Consequently, a shift towards a more dynamic, systematic, and prospective competency framework is imperative, anchoring competency development to the intrinsic requirements of NQPFs and achieving a fundamental transition from "knowledge transmission" to "capability empowerment."

3 Constructing the Core Competency Model for University Students' Innovation and Entrepreneurship Oriented Towards NQPFs

3.1 Theoretical Foundation of the Model

Surveys indicate that while most universities have established practical platforms like entrepreneurship parks and incubators, many operational issues persist. For instance, competitions like innovation and entrepreneurship contests primarily serve as experiential simulations belonging to the "second classroom," and their effectiveness in practical education needs enhancement [4]. This study draws on the Iceberg Model of Competence and Constructivist Learning Theory, positing that deep, transferable comprehensive qualities are key to innovation and entrepreneurship success. The model construction follows the principles of systematicity, measurability, and orientability.

3.2 Dimensions and Connotations of Core Competencies

Value Insight and Definition Ability: The capacity to identify cutting-edge technological trends, recognize latent societal needs and pain points, and precisely define innovation opportunities. This is the starting point.

Innovative Thinking and Problem-Solving Ability: Encompasses critical thinking, design thinking, and systems thinking, serving as mental tools for navigating uncertainty and solving complex problems.

Technical Implementation and Integration Ability: Refers not only to mastering specific domain expertise but, more importantly, to the ability to use tools like "AI+" for technology integration, rapid prototyping, and iterative optimization.

Team Leadership and Resource Integration Ability: Includes cross-disciplinary and cross-cultural collaboration, leadership, and the efficient acquisition of internal and external resources such as funding, technology, and market access.

Entrepreneurial Action and Risk Response Ability: Emphasizes agile action, rapid experimentation, risk management, and the understanding and application of industrial policies, laws, and regulations.

3.3 Comparative Analysis with Traditional Models

In today's rapidly changing economic environment, school enterprise cooperation has become a key link between higher education institutions and enterprises, especially in the field of innovation and entrepreneurship education. Universities and enterprises should establish close cooperative relationships, jointly carry out innovation and entrepreneurship education and practical activities, establish school enterprise cooperation platforms, and jointly promote the integration of industry, academia, and research. [5] The cultivation path should be student-centered, emphasizing the construction of knowledge and the development of skills through completing project tasks in real or highly simulated situations[5]. It elevates practical elements like "Risk Response" to core positions, better aligning with the NQPF pursuit of "high-tech" and "high-efficiency."

4 Designing the Practical Training Path Based on the Core Competency Model

4.1 Core Philosophy: "Learning by Doing" and "Learning by Creating"

The training path is student-centered, emphasizing the construction of knowledge and honing of abilities through completing project tasks in authentic or highly simulated contexts.

4.2 The Three-Stage Training Path

Stage 1: Basic Cognition & Project Simulation (On-Campus Platform): Utilizes frontier lectures, innovation workshops, and virtual simulation projects (e.g., entrepreneurship sandbox games) to stimulate interest and preliminarily train value insight and innovative thinking. The goal is to establish a solid cognitive foundation.

Stage 2: Interdisciplinary Integration & Prototype Incubation (University-Enterprise Platform): Based on real-world problems from enterprises, interdisciplinary project teams are formed to conduct technical verification and prototype development in makerspaces or labs. The core objective is to intensively develop technical implementation, teamwork, and resource integration abilities.

Stage 3: Market Verification & Enterprise Acceleration (Societal Platform): Encourages students with relatively mature projects to participate in high-level innovation competitions, enter technology business incubators, and face direct market testing. This stage aims to fully activate and enhance entrepreneurial action and risk response capabilities.

4.3 Key Supporting Mechanisms

The effective operation of this path relies on a "Dual-Qualified" mentor team (academic + industry+mentors), Materialized-Practice-Platform-integrating"ideation-design-manufacturing-testing," and a scientific evaluation system incorporating competition results, incubation outcomes, and market feedback into credit recognition.

5 Case Study Analysis: Validating the Effectiveness of the Core Competency Model and Training Path

5.1 Case Selection and Analysis Method

1.This study selected three representative cases that have fully undergone the aforementioned three-stage training path and achieved significant results in technology implementation or business models.

5.2 Multi-Case Presentation and Analysis

Case 1: The "Attitude Exhibition" – A Practice in the Practical Training Path

The "Attitude Exhibition" is a branded art exhibition project born within a university, successfully running for eleven consecutive editions. It consistently focuses on female artists and women's issues, adopting a "teacher-student co-creation" model. Through eleven iterations, the project has evolved from an initial teaching experiment into a stable, mature, and increasingly influential practical training platform. Its core value lies in being not just a single exhibition, but a inheritable, iterable "living" system, where each edition builds upon the previous one, providing near-authentic innovation and entrepreneurship scenarios for successive student cohorts.

Stage 1: Basic Cognition & Project Simulation (On-Campus Platform) – Knowledge Inheritance and Thematic Deepening

Value Insight through Academic Accumulation: Upon forming a new team each year, the primary task is not starting from scratch, but systematically studying the archives of the ten previous exhibitions. This allows students to gain historical depth in value insight.

Simulated Curatorial Framework: Past complete proposals, budgets, and agreements serve as valuable templates for simulation. New teams analyze past decisions to develop more feasible and innovative plans for the current edition.

Stage2: Interdisciplinary Integration & Prototype Incubation (University-Institution Collaboration Platform) – Process Optimization and Network Expansion

Process Standardization and Optimization: Years of experience have led to efficient standard operating procedures for teacher-student-artist collaboration. New teams can quickly onboard, focusing energy on creative realization rather than process navigation.

Snowball Effect of Resource Networks: The accumulated network of artists, partners, media, and sponsors forms a powerful ecosystem. New teams can leverage this brand equity to engage higher-quality partners.

Stage 3: Social Dissemination & Value Extension (Societal Platform) – Brand Building and Value Consolidation

From Single Event to Brand Building: The exhibition's longevity establishes it as an academic brand. Student teams focus on sustained social media operations, transforming event-based attention into long-term brand equity.

Sustainable Value Exploration: Teams explore entrepreneurial actions like publishing proceedings, developing derivatives, and hosting branded events, exploring economic sustainability beyond academic value

This project involved designing lighting for a key Jiangnan International Resort development in Jiande City. The student team proposed the revolutionary concept of "letting light grow," contrasting with traditional additive lighting approaches.

Stage 1: Basic Cognition & Project Simulation – Precisely Positioning the Commercial Value Proposition

The team began with market analysis, identifying pain points in traditional nightscape lighting (homogenization, lack of narrative). They positioned their design not as a cost, but as a profit center capable of increasing visitor dwell time and spending.

Case 2: Cultural Tourism Project – "Let Light Grow from Jiangnan's Genes" (International Tourism Resort Lighting Design Proposal)

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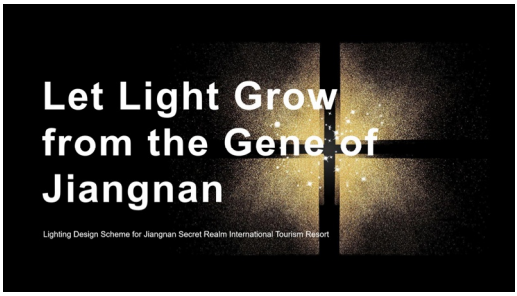

Fig. 1. Let Light Grow from Jiangnan's Genes" (International Tourism Resort Lighting Design Proposal)

Stage 2: Interdisciplinary Integration & Prototype Incubation – Building a Deliverable "Product" Prototype

Adopting a lean startup approach, the team created a Minimum Viable Product (MVP) for key nodes like the visitor center to validate the concept cost-effectively and mitigate risk.

Operating like a company, the team managed project plans, budgets, and collaborated with technical suppliers, demonstrating team leadership and resource integration. As show in figure 2.

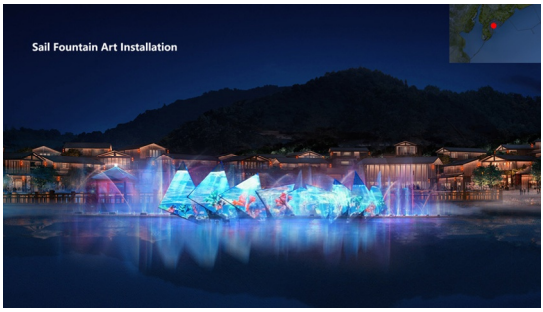

Fig. 2. Spring device rendering

Stage 3: Market Verification & Enterprise Acceleration – Exploring a Sustainable Business Model

Combining Spring device rendering technology into the core solution, the team proposed an innovative "lighting environment operation service" model, moving beyond a one-time design fee to potential revenue-sharing based on increased income, aligning their success with the project's long-term viability.

Winning provincial competitions and receiving recognition from industry players provided crucial endorsement and opened doors for future careers or entrepreneurship.

Case 3: Brand Creation "Guan Xiang Cheng" – Design Thinking and Digital Media Empowering Cultural Wellness Brand Innovation

"Guan Xiang Cheng" is a cultural wellness brand centered around traditional Chinese medicine aromatic beads, created through teacher-student collaboration.

Stage 1: Inspiration and Ideation – From Cultural Insight to Brand Positioning, with the logoDesign Diagram as a core visual anchor

The team identified a market shift towards preventive wellness and emotional healing, using digital tools to analyze trends and position the brand around "Eastern aesthetics" and "slow living." As show in figure 3.

Fig. 3. Logo Design Diagram

Stage 2: Teacher-Student Collaboration and Work Content – Building an Interdisciplinary Innovation Workshop

Visual Design Group: Created the full visual identity system, reflecting the brand's cultural essence.

Digital Media Technology Group: Developed core digital narratives: a brand concept animation, micro-documentaries, and a mini-program. The mini-program included features like 3D animations explaining herb efficacy and a "mood tracker" to collect user feedback anonymously, enabling data-driven product iteration. It also fostered a community through shared content.

Stage 3: Sales and Promotion – Building an Immersive Digital Brand Experience

A social media matrix was created across platforms like Xiaohongshu and Douyin, focusing on community engagement around cultural themes.

The WeChat ecosystem integrated official articles, the e-commerce mini-program, and a community forum.

Online live sessions and plans for offline pop-up experiences aimed to blend digital and physical interactions. As show in figure 4.

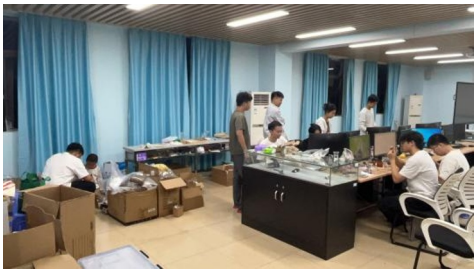

Fig. 4. Teacher-Student Collaboration and Work Content

Case Effectiveness and Revelation: The "**Guan Xiang Cheng**" brand creation process demonstrates that in the digital economy era, innovation must transcend mere product thinking. By leveraging design empowerment, digital media, and interdisciplinary collaboration, it is possible to build a vibrant brand that leads new lifestyles. This "technology invisible, experience paramount" approach exemplifies the core objective of NQPF-oriented innovation and entrepreneurship education.

6 Conclusion and Outlook

This study constructed a core competency model for innovation and entrepreneurship oriented towards NQPFs and designed a corresponding spiral practical training path. The conclusion indicates that university innovation and entrepreneurship education must undergo a paradigm shift from knowledge transmission to capability empowerment, and from a closed campus to an open ecosystem. The proposed model and path provide a concrete scheme for this transformation. Limitations include the scope of

cases, which could be expanded. Future research could focus on the dynamic evolution of the competency model and utilizing big data to provide personalized training plans, thereby more precisely and efficiently cultivating the new force of innovators and entrepreneurs capable of leading the development of NQPFs.

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