

Three-Dimensional Value Mechanism Analysis of Integrating New Quality Productive Forces into University Talent cultivation Education

Haiyan Ou, Shengliang Liu*

School of Marxism, Guilin Medical University, Guilin, Guangxi, China

**Corresponding Author*

Abstract: The deep integration of new quality productive forces (NQPFs) into university talent cultivation education addresses three core challenges—content obsolescence, singular objectives, and traditional pedagogies—through a three-dimensional mechanism: objective realignment to anchor strategic educational coordinates, pedagogical innovation to activate educational ecosystems, and competency empowerment to lay future developmental foundations. Its core value lies in strengthening the alignment between ideological education and national innovation strategies, cultivating interdisciplinary talent with both patriotic commitment and innovative capabilities, and providing foundational support for the integrated development of education, science and technology, and human capital.

Keywords: New Quality Productive Forces; University Talent Cultivation Education; Value Mechanism; Strategic Talent Cultivation; Competency Empowerment

1. Introduction

As a core engine driving high-quality economic and social development, NQPF—characterized by technology-driven innovation, efficient resource allocation, and deep industrial transformation—is profoundly reshaping global competition patterns and national development trajectories. Its systematic integration into the talent cultivation education framework of HEIs represents a strategic response to contemporary imperatives and educational challenges. Current talent cultivation education in HEIs faces three major dilemmas: content lags behind emerging ethical and governance issues triggered by disruptive technologies; objectives remain narrowly focused, failing to meet the demands

of the "self-reliance and self-improvement in science and technology" strategy for fostering innovation-driven mission and ethical awareness; and traditional teaching methods struggle to engage digitally native learners [1]. The integration of NQPF, through its three-dimensional value mechanism of goal redefinition, model innovation, and competency empowerment, offers theoretical logic and practical pathways for building a future-oriented talent cultivation education ecosystem. This integration is essential to advancing the integrated "trinity" strategy of education, science and technology, and talent development [2], while resolving the deficiencies of talent cultivation education in HEIs—such as insufficient contemporaneity, weak relevance, and declining appeal—ultimately serving the goal of cultivating versatile talents capable of shouldering the mission of national rejuvenation.

2. Anchoring New Strategic Coordinates for Talent Cultivation

Amidst the convergence of technological revolution and industrial transformation, NQPF—an advanced productive force centered on all-factor innovation and oriented toward high-quality development—is fundamentally reconfiguring global economic landscapes and national competition paradigms. Its transformative momentum demands revolutionary shifts in talent competencies. Integrating NQPF into talent cultivation education in HEIs enables a breakthrough from traditional path dependencies, systematically redefining educational goals to guide students in aligning personal aspirations with national rejuvenation, thereby forging the foundation for cultivating top innovative talents essential to advancing NQPF.

2.1 Cultivating a New Quality Talent Ecosystem

The flourishing of NQPF hinges on the systematic leap and synergistic convergence of advanced factors such as knowledge, technology, and talent. Its core driver is talent—particularly versatile strategic talents with profound patriotism, global vision, innovative spirit, and practical capabilities. As highlighted in WIPO's 2023 Global Innovation Index, national innovation capacity correlates significantly with high-caliber talent reserves. Against this backdrop, integrating NQPF into talent cultivation education transcends traditional models focused solely on political literacy, enabling a strategic expansion and multidimensional reconstruction of educational objectives [3]. By embedding ideals of "applying technology for national development" and missions of "building an innovation-driven nation" into the value guidance system, it promotes the spirit of scientists and craftsmanship [4]. This integration helps students deeply grasp the symbiotic relationship between technological innovation and national destiny. For instance, analyzing the root causes and breakthrough paths of "technological bottleneck" constraints reveals the strategic significance of technological self-reliance as a national "lifeline." It also clarifies students' historical role in the NQPF wave—not merely as future users of technology, but as pioneers of original innovation and solvers of critical challenges. Exemplary cases, such as the arduous journey of the "BeiDou" navigation team or the deep-sea exploration feats of the "Striver" crew, translate abstract national strategies into tangible models of inspiration. Thus, talent cultivation education becomes a crucible for forging "new-era talents" who can propel NQPF and shoulder national rejuvenation, channeling individual potential into the grand narrative of China's technological advancement.

2.2 Forging Innovation Ecosystem Foundations

The emergence and vitality of NQPF rely on open, collaborative, resilient innovation ecosystems. Success stories like Silicon Valley and rising innovation hubs in Beijing and Shenzhen underscore the need for shared values and cultural soil as intangible bedrock. Integrating NQPF transforms talent cultivation education from a "value transmitter" to an

"innovation ecosystem shaper," positioning it as an active advocate and guardian of innovation culture. This shift moves beyond one-way knowledge dissemination to cultivate a community that celebrates scientific rationality, exploration, tolerance for failure, and adherence to ethical principles—providing indispensable cultural nourishment for disruptive technologies and industrial transformation. On one hand, it promotes role models such as scientist spirit (rooted in patriotism), entrepreneur spirit (centered on integrity), and labor ethos (embodying dedication), igniting students' intrinsic motivation to contribute through innovation and skill mastery. On the other, it critiques academic impatience, misconduct, and skewed evaluation metrics (e.g., overemphasis on publications or titles). By incorporating discussions on major ethical dilemmas in science and technology, it reinforces research integrity and ethical boundaries, helping students recognize the dialectical unity between innovation freedom and social responsibility. Ultimately, NQPF integration fosters a culture of respect for rules and original thinking, making talent cultivation education an incubator for the innovative spirit vital to NQPF—elevating its role from ideological guidance to ecological construction.

2.3 Integrating Scientific-Humanistic Competencies

NQPF arises from the complex convergence of multidimensional elements—scientific innovation, high-end talent, intelligent capital, and big data—at an advanced level. Its inherent complexity demands the dissolution of rigid disciplinary boundaries, emphasizing deep integration between natural sciences and humanities. Integrating NQPF spurs pedagogical innovation in talent cultivation education [5], rejecting historical biases of "privileging humanities over sciences" or vice versa. It positions talent cultivation education as a bridge between disciplines, guiding students to appreciate the profound humanistic value and societal implications of technological progress [6]. Through case studies on topics like algorithmic bias in AI, privacy boundaries in big data, or bioethical challenges, students learn that technology is not value-neutral—its trajectory and impact require humanistic scrutiny and ethical wisdom. Concurrently, it underscores the irreplaceable role of humanities (e.g.,

philosophy, ethics, law, sociology) in shaping responsible innovation governance, adapting to socio-technical disruptions, and ensuring human-centered technological development. This interdisciplinary approach cultivates talents who grasp advancements in quantum computing or biomedicine yet remain grounded in humanistic values; who possess scientific rigor and engineering prowess alongside critical thinking, ethical sensitivity, and cross-cultural communication skills. By integrating NQPF, talent cultivation education constructs a "critical bridge" between technological rationality and humanistic values, advancing holistic human development while infusing NQPF with profound intellectual vitality and ethical direction for sustainable, people-centered progress.

3. Activating an Integrated Pedagogical Ecosystem

The rise of NQPF, marked by its contemporaneity, cutting-edge nature, and disruptive potential, injects vitality into the evolution of talent cultivation education in HEIs. It not only reshapes the foundational logic of socio-economic development but also offers systemic solutions to persistent challenges like "content lagging behind practice," "low methodological appeal," and "theory-practice disconnection." As AI redefines cognition, quantum computing expands intellectual frontiers, and biotechnology tests ethical frameworks, embedding NQPF's dynamics, achievements, and value propositions into teaching practices enables the creation of a vibrant, technology-empowered, boundary-spanning talent cultivation education ecosystem—transforming curricula into engines that inspire students to comprehend and engage with transformative times.

3.1 Integrating Frontier Case Studies

Traditional talent cultivation education curricula prioritize content stability for systematic knowledge transfer but struggle to keep pace with rapid technological and industrial shifts. Their slow update cycles and outdated cases hinder timely, accurate reflection of breakthroughs in NQPF domains and their societal impacts. Integrating NQPF's frontier developments—especially in AI, quantum information, biomedicine, advanced materials, clean energy, aerospace, and deep-sea

exploration—converts landmark scientific achievements, industrial milestones, and emblematic innovators into dynamic, persuasive educational resources[7]. For example, when discussing social issues, examining new employment forms driven by the digital/platform economy allows students to dialectically analyze opportunities and challenges like labor rights protection. NQPF provides an inexhaustible "rich vein" for talent cultivation education. By reconstructing the content system around contemporary cases, curricula gain immediacy and tangibility, resolving content obsolescence while enhancing relevance and explanatory power.

3.2 Empowering Smart Pedagogy

A hallmark of NQPF is the explosive growth of intelligent technologies—AI, big data, cloud computing, and VR/AR/MR. These tools are not only components of NQPF but also offer unprecedented support for revolutionizing talent cultivation education pedagogy [8]. Intelligent empowerment enables precision teaching: big data analytics map student behaviors, preferences, comprehension, and attitudes ("learning portraits"), helping teachers identify knowledge gaps, interests, and conceptual hurdles. This data informs personalized teaching plans, tailored resources, and targeted interventions, shifting from "broadcast irrigation" to "precision drip irrigation." VR/AR/MR technologies create immersive scenarios, expanding the spatiotemporal and sensory dimensions of classrooms. AI tutors provide 24/7 personalized support—answering questions, planning learning paths, offering feedback, and recommending adaptive exercises—deepening interaction. Cloud-based platforms facilitate cross-institutional, interdisciplinary collaborative research and debates, extending learning beyond physical confines. Technology not only boosts engagement and interactivity but also reshapes teacher-student dynamics: talent cultivation education evolves from monologue to dialogue, static presentation to dynamic generation, and closed classrooms to boundless learning spaces—significantly enhancing its appeal and contemporary relevance.

3.3 Cultivating Mission-Driven Praxis

Practical learning is the "vital link" and "dynamic source" of talent cultivation education,

bridging knowledge, skills, values, and action. NQPF's transformative energy opens vast possibilities for innovating practical pedagogy. By extending learning to NQPF's frontlines, students deepen understanding, strengthen commitment, and bridge theory-practice gaps in authentic contexts. Structured activities immerse students in NQPF's "birthplaces," "incubators," and "application fields"—national labs, tech innovation hubs, leading enterprises, R&D institutions, and industrial parks. Programs like "Innovation and Social Responsibility" field studies, "Dialogues with Era Role Models," and "Future Industrial Policy Simulations" offer thematic, diverse experiential learning[9]. These "mobile classrooms" foster not only cognitive growth but also emotional resonance and value internalization. By engaging directly with innovation, participating in change, and contemplating era-defining questions, students transcend abstract concepts. They tangibly witness national progress, grasp the synergy between individual efforts and national strategies, and internalize the mission to advance NQPF and serve national rejuvenation—transforming external expectations into intrinsic motivation [10].

4. Laying Future Developmental Foundations

The ultimate value of integrating NQPF into talent cultivation education lies in systematically forging students' future-oriented core competencies. NQPF's traits—innovation-driven, intelligence-led, green and low-carbon, open and integrated—demand unprecedented versatility in knowledge structures, thinking modes, values, and practical abilities. By incorporating NQPF's theoretical logic, practical manifestations, and value propositions, talent cultivation education effectively guides students to build future-proof cognitive frameworks, hone transformative competencies, and elevate value consciousness aligned with national strategies.

4.1 Upgrading Cognitive Frameworks

The rapid development of NQPF is reshaping the production functions, lifestyles, and even civilizational forms of human society with unprecedented breadth and depth. The paradigm shifts it brings require the younger generation to break through traditional cognitive boundaries and construct new cognitive schemas adaptable to complexity, dynamism, and uncertainty.

University talent cultivation-political education bears the critical mission of leading the iteration and upgrade of these cognitive frameworks. Integrating NQPF guides students to deeply understand and internalize core tenets such as "innovation is the primary driving force of development" and "scientific and technological self-reliance and self-strengthening is the strategic support for national development," transforming these grand narratives into the underlying logic of individual world cognition [6]. It encourages students to consciously use ideological theories to penetrate technological appearances and discern the deep logic and complex impacts of technological advancement. This cultivates students' ability to dialectically examine the "double-edged sword" effects of technology: recognizing both the immense potential of disruptive technologies like AI and gene editing to liberate productivity and enhance human welfare, and being acutely aware of the ethical violations, social risks, and ecological challenges they may trigger. Through rational analysis of these deep contradictions and potential risks, students are guided beyond simplistic dichotomies of technological optimism or pessimism, establishing a view of "prudent innovation" and "sustainable technological development" that emphasizes responsibility ethics, risk prevention, and humanistic care. Simultaneously, integrating NQPF guides students to deeply understand the systemic development thinking it demands. For example, firmly establishing an ecological civilization concept of "harmonious coexistence between humanity and nature," recognizing that green development is an inherent requirement of high-quality development, and that technological innovation must serve the perpetual protection of the ecological environment and resource recycling; actively advocating a global development concept of "open cooperation for win-win results," understanding that in today's deeply globalized world, breakthroughs in technological innovation and responses to global challenges (e.g., climate change, public health crises) are inseparable from open and inclusive international scientific cooperation and governance systems. This systematically iterated and upgraded cognitive framework, integrating scientific rationality, humanistic care, and a global perspective, will serve as students' "intellectual compass" and "value anchor" for

navigating future technological ethical dilemmas, participating in global governance, and leading sustainable development directions.

4.2 Constructing Interdisciplinary Competencies

The essence of NQPF is an advanced qualitative state of productivity led by innovation. Its disruptive requirements for talent competency structures are concentrated in the urgent need for higher-order thinking and compound abilities. Traditional singular skills or knowledge reserves are insufficient to cope with rapidly iterating technological environments and highly complex real-world challenges. A core efficacy of integrating NQPF themes into talent cultivation education lies in transcending mere knowledge transmission to become the “key forging ground” for systemically reconstructing students' core competencies [10]. This integration drives talent cultivation education to focus on cultivating four key competencies: First, Critical and Innovative Thinking: Students learn to interrogate phenomena, policies, and ethical quandaries in NQPF development, conducting multi-angle analysis and rational evaluation. Second, Complex Problem-Solving: Talent cultivation education trains students to dissect intertwined technological, economic, social, and policy factors, apply systems thinking, balance stakeholder interests, integrate interdisciplinary knowledge, and devise actionable solutions. Third, Interdisciplinary Integration: It breaks disciplinary silos, emphasizing that major technological issues transcend pure science/technology. Students gain fluency across knowledge systems, forming holistic perspectives. Finally, Digital Literacy and Lifelong Learning: Students develop the drive and methodology to embrace change, continuously upskill, and build resilience amid rapid knowledge obsolescence. These synergistically developed competencies constitute the “pillars” sustaining students' competitiveness and sustainable growth in an NQPF-driven future.

4.3 Internalizing Sci-Tech Patriotism

The ultimate purpose of knowledge transmission and ability cultivation is to guide students towards profound value identification, manifested as conscious action. For talent cultivation in the NQPF era, the fundamental measure of talent cultivation education's

effectiveness is whether the deep understanding of national development strategies, genuine affection for the great cause of national rejuvenation, and sincere reverence for the scientific spirit and craftsmanship ethos can be internalized into a powerful and enduring endogenous drive for engaging in scientific innovation and serving high-quality development. The integration of NQPF provides the most vivid and inspiring material and spiritual nourishment for elevating this value identification. By deeply interpreting the nation's strategic deployments and great practices in key NQPF fields, it intimately connects grand national narratives with individual life meaning. Showcasing the extraordinary achievements—garnering worldwide acclaim—made by generations of scientists and engineers in fields like deep space exploration, deep-sea expeditions, BeiDou navigation system construction, and major basic research facilities under extreme hardship [4], its significance lies not only in presenting the technological breakthroughs themselves but, more importantly, in revealing the deep patriotism, firm ideals and beliefs, selfless dedication, and rigorous scientific attitude underpinning these accomplishments. These epics of struggle and the spiritual codes they embody are invaluable assets for inspiring value resonance and emotional identification among students. Crucially, integration guides students towards deep value reflection and self-positioning: understanding the urgency and strategic significance of achieving self-reliance and self-strengthening in key core technologies; recognizing their historical responsibility as the future main force in technological innovation; contemplating how to organically combine personal professional interests and career planning with the strategic needs of “national priorities”; appreciating the lofty life realm and eternal value embodied in the spirit of scientists and craftsmanship. Through this deep value dialogue and meaning construction, students' emotional identification with the nation's scientific and technological endeavors is elevated to rational value identification, and their inspiration from role models transforms into a strong will to act. The ultimate goal is to achieve “resonance” between personal ideals and national needs. Integrating NQPF helps students clearly recognize that in the surging tide of its emergence, there exists a profound

intrinsic unity between the realization of individual talent and value, and the nation's prosperity, development, and national rejuvenation. Channeling personal intellect into the grand journey of national scientific and technological self-reliance is not only the highest manifestation of individual life value but also the glorious mission entrusted by the era to the younger generation. This drives “patriotic sentiment” and “aspiration for national strength” beyond mere emotional expression, truly landing as “actions to serve the nation” through diligent study, courage to innovate, and dedicated contribution, completing the full internalization process from value cognition to emotional identification to conscious action. This deeply rooted value resilience and action consciousness is the inexhaustible “spiritual engine” driving university students to fear no hardship, scale new heights, and dedicate themselves to serving the nation through science and technology in future explorations and industrial transformations.

5. Conclusion

Deeply integrating NQPF into talent cultivation education in HEIs is not mere content augmentation but a profound educational transformation. It redefines objectives to align with national strategies and the traits of “new-era talents”; it revolutionizes content and methodology, infusing curricula with contemporaneity and practical vitality; and it empowers students’ core competencies, laying solid foundations for thriving amid technological and industrial upheaval. This integration not only enhances the ideological depth, theoretical rigor, relevance, and appeal of talent cultivation education but also positions it as a strategic pivot for nurturing NQPF-ready talents—injecting powerful intellectual momentum and talent security into the construction of an education-powered, technology-strong, and talent-rich nation.

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