

Research Pathways of Cultivating Talents Through Research in Jiangsu's Universities under the "Double-High Synergy" Initiative

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Abstract

Cultivating talents through research integrates knowledge impartation, innovation capability cultivation, and value shaping into a cohesive whole. It serves as the convergence point of the three fundamental functions of higher education institutions—talent cultivation, scientific research, and societal service—and constitutes a critical pathway for fostering innovative talent, playing an irreplaceable role. The "Double-High Synergy" (collaborative innovation and development between high-tech zones and higher education institutions) is a strategic initiative deployed at the provincial level in Jiangsu, aimed at systematically establishing a new paradigm for the deep integration of higher education institutions and high-tech zones. Against the backdrop of Jiangsu's "Double-High Synergy," this paper analyzes its collaborative education mechanism, addresses bottlenecks in the advancement of talents through research, and explores new pathways through which research practices in Jiangsu's universities can feed back into the cultivation of innovative talent.

Keywords: Double-High Synergy; cultivating talents through research; innovative thinking; interdisciplinary talent cultivation; research evaluation; science-education collaboration; industry-education collaboration.

Introduction

The current global competition is unprecedentedly fierce, and its essence is a competition in technology and innovative talent. At the same time, addressing global challenges such as climate change, energy crises, and disease prevention and control requires solutions through technological innovation. Ultimately, all of these depend on first-class innovative talent, making it an inevitable choice and a mission of the era for universities to accelerate the cultivation of such individuals.

Cultivating talents through research serves as the convergence point of the three fundamental functions of higher education institutions: talent cultivation, scientific research, and societal service. It is a critical pathway that integrates knowledge impartation, ability development, and value shaping, playing an irreplaceable role in fostering innovative talent. However, cultivating talents with interdisciplinary thinking and innovative capabilities remains the core challenge in this process, underlying which are issues such as the allocation of educational resources, institutional barriers, and outdated development concepts.

In July 2025, to foster new quality productive forces, Jiangsu officially launched the "Double-High Synergy" initiative, exploring the deep integration of technological innovation and industrial innovation through the model of "organized research + organized transformation" (General Office of the People's Government of Jiangsu Province, 2025; Jiangsu Provincial Department of Science and Technology, 2025). By analyzing the new collaborative education mechanism of the "Double-High Synergy," this paper explores new pathways to address the core challenges in cultivating talents through research, providing theoretical references and practical insights for deepening the reform of higher education.

Cultivating Talents Through Research: A Key Pathway to Fostering Innovative Talent

Core and key technologies cannot be acquired, bought, or begged for from others (Xi, 2018). To achieve technological self-reliance and independence, it is essential to enhance the capability to independently cultivate top-tier innovative talents.

First, research activity is one of the most effective avenues for nurturing innovative talent. The core mission of research is to explore the unknown and generate new knowledge. Its essence lies not only in the transmission of knowledge but also in achieving breakthroughs, restructuring, and expanding the frontiers of knowledge. Throughout the research process, investigators continually encounter new problems and challenges. By actively participating in activities such as project design, experimental inquiry, and thesis writing, students can systematically enhance their problem-solving abilities, refine critical thinking skills, and stimulate their potential for original innovation. Moreover, a research environment that encourages exploration, tolerates failure, and upholds the pursuit of truth plays a crucial role in shaping an innovative mindset.

Second, cultivating talents through research promotes the transformation of traditional educational paradigms. Traditional education tends to overemphasize knowledge transmission and exam-oriented training, which can stifle students' curiosity, imagination, and spirit of adventure. In contrast, cultivating talents through research advocates "learning through research," effectively addressing the gap in fostering innovative competencies within traditional classroom teaching. It shifts the focus of education from "what to teach" to "how to learn" and "how to create," thereby transforming students from passive recipients of knowledge into active explorers and creators.

Therefore, placing cultivating talents through research at the core and deepening the reform of educational models are of decisive significance for training innovative talents capable of meeting future challenges.

Challenges in Promoting Cultivating Talents Through Research in Universities

Over the years, cultivating talents through research has evolved from a conceptual advocacy into concrete practices within higher education institutions, achieving remarkable results. However, it still faces three major challenges—difficulty in fostering innovative thinking, difficulty in cultivating interdisciplinary talent, and difficulty in reforming research evaluation—which constrain the overall effectiveness of training innovative talents.

2.1 Difficulty in Fostering Innovative Thinking

Innovative thinking is a cognitive activity aimed at creating new things or methods. It is not only a crucial capability for personal growth but also a core driver of technological progress and social development.

According to Bloom's taxonomy, traditional classroom teaching largely remains at the levels of knowledge transfer and comprehension, which only fosters surface learning and lower-order thinking, making it difficult to support the development of innovative talents. In contrast, when undergraduate students engage in research, they enter into deeper learning processes such as application, analysis, synthesis, and evaluation, which is conducive to cultivating higher-order thinking like critical thinking and innovative ability (Zhou, et al., 2018a). Currently, the teacher-centered, one-way knowledge transmission model denies students opportunities to actively identify, analyze, and solve problems in authentic contexts. Furthermore, academic assessment methods overly emphasize memorization of course content and lack evaluation of students' thinking skills and innovative literacy, further restricting the development of their higher-order cognitive abilities.

Cultivating university students' innovative thinking through research activities has become a consensus in the field of higher education. In reality, universities generally face the contradiction between continuously expanding student numbers and limited research resources. To alleviate this dilemma, reforming the curriculum system as a key breakthrough and vigorously increasing the supply of "gold-standard courses" and project-based courses has become a suboptimal yet feasible path under current constraints. However, this reform still faces the following issues:

First, there is insufficient integration of research and education. Current professional promotion and performance evaluation systems generally prioritize research over teaching, with teaching achievements carrying relatively low weight. This leads faculty to rationally devote their main efforts to research. Simultaneously, high barriers exist in translating faculty research outcomes into teaching resources. Converting cutting-edge, complex research results into teaching cases or experimental projects understandable and accessible to undergraduates requires significant time and effort from faculty for "re-creation." Under the prevailing evaluation incentives, faculty lack intrinsic motivation for this creative work (Zhou, et al., 2018a, 2018b). These factors result in traditional classroom content lacking intellectual challenge and

limited teacher-student interaction, making it difficult for courses to effectively fulfill the function of cultivating talents through research (Wu, 2018).

Second, there is inadequate integration of industry and education. There is a lack of institutionalized and systematic connection mechanisms between universities and enterprises, hindering the timely and accurate transmission of "demand-side" information from industry to the "supply-side" in higher education. If research is disconnected from real-world problems at the industry frontier, the curriculum system and practical content will lag severely behind technological changes. Without complex cases from real industrial projects as practical vehicles, students struggle to cultivate critical thinking and the ability to systematically solve complex problems through the process of questioning, analyzing, and reconstructing real-world issues.

Third, the coverage of research-based education is limited. In existing training programs, research training is mostly concentrated in the later years of study. High-level research platforms such as State Key Laboratories and Engineering Centers primarily serve major research projects and postgraduate education, with underdeveloped mechanisms for opening these resources to undergraduates, especially lower-year students. This fragmentation prevents research-based education from being integrated throughout the entire university experience. Furthermore, various challenging disciplinary competitions and university-level research training projects are typically participated in by a small number of academically top-performing students, falling far short of the goal of "all-students" coverage.

2.2 Difficulty in Cultivating Interdisciplinary Talent

Interdisciplinary learning can expand cognitive boundaries and provide the necessary conditions for generating associations and imagination. However, under the traditional "department-major" organizational structure of universities, disciplinary barriers remain entrenched, making it difficult to construct interdisciplinary thinking and knowledge systems. This fails to meet the contemporary need to "promote the integration of different disciplines and cultivate composite innovative talents."

Universities face multiple obstacles in promoting cross-major course selection, joint student supervision, and co-construction of interdisciplinary courses, including administrative management, funding allocation, and attribution of outcomes. Existing specialized training programs have relatively rigid knowledge structures and lack top-level designs that integrate the logics of multiple disciplines. Additionally, there is a severe shortage of faculty with interdisciplinary perspectives and competencies capable of designing and teaching high-quality interdisciplinary courses, hindering the deep integration of concepts, methods, and thinking from different disciplines (Wang & Chang, 2022; Zhang & Liu, 2023). These issues further impede the development and integration of innovative thinking.

2.3 Difficulty in Reforming Research Evaluation

The research evaluation mechanism plays a significant guiding role in faculty participation in research-based education. The current evaluation system generally exhibits a tendency to "prioritize research over teaching, prioritize papers over application, prioritize vertical projects over horizontal collaboration," resulting in

insufficient motivation for faculty to transform research outcomes into teaching resources and low enthusiasm for investing in teaching and industrial application.

At a deeper level, this stems from the combined effect of external evaluation orientations, such as university rankings and discipline assessments, and internal resource allocation mechanisms. This leaves faculty with little institutional incentive to engage in the integration of research and education or industry-academia collaboration, resulting in relatively insufficient investment in teaching and talent development. Under these value preferences, not only are direct channels for educating through research activities obstructed, but the subtle, transformative educational function of research is even harder to achieve (Zhou, et al., 2018a, 2018b).

Most universities (except vocational undergraduate institutions) require students to pass a thesis (project) defense as a mandatory graduation requirement. If students engage in projects aimed at solving practical problems, they face greater challenges, longer cycles, and outcomes that are often difficult to quickly convert into papers meeting academic standards. To avoid the risk of delayed graduation, writing and publishing academic papers becomes the rational choice for both faculty and students. Under the current evaluation system, the input-output ratio of writing papers is significantly higher than conducting real project research. When institutional incentives clearly favor papers, faculty and students are naturally guided towards academic output rather than technological application.

2.4 Conceptual and Mechanism Innovation as Key to Addressing the Three Challenges

To systematically address the three challenges, coordinated efforts should be made in four areas: conceptual renewal, curriculum restructuring, mechanism coordination, and evaluation reform:

First, establish the core concept of "Research as Learning." It should be fully recognized that research is a fundamental mode of talent cultivation in modern universities, and research activities organized by universities should serve teaching (Zhou, et al., 2018a). It should also be fully recognized that inquiry-oriented research activity is itself the highest form of learning. It is both the best way to stimulate student potential and cultivate innovative ability, and an intrinsic driver for activating faculty academic vitality .

Second, restructure the curriculum system. The curriculum is the most fundamental and extensive vehicle for implementing research-based education. Integration of research and education should be strengthened, promoting the infiltration of high-level research practices from the "second classroom" (e.g., discipline competitions, labs) into the first classroom (Zeng, et al., 2020). Universities should focus on integrating research thinking and academic norms into course modules, building a batch of "gold-standard courses" characterized by high-order, innovation, and challenge. In particular, there should be a significant increase in project-based courses grounded in real problems, enabling students to hone their innovative thinking and practical abilities through solving complex problems (Wu, 2018).

Third, strengthen mechanism coordination to break down institutional barriers. Research bases should be opened to undergraduates, supporting students in "entering laboratories and research teams early"(Huang et al., 2021). Universities should vigorously promote industry-academia integration at the institutional level, systematically restructure talent training programs, and build an integrated innovation ecosystem linking research, education, and industry by transforming cutting-edge research results and advanced industrial technologies into high-quality teaching resources.

Fourth, optimize the evaluation system to refocus efforts on education. Although university research evaluation is constrained by external factors like discipline assessments, there is still room for proactive internal action. Internal evaluation systems should be actively optimized, implementing classified evaluation mechanisms characterized by "representative achievements" and "long-cycle evaluation," and significantly increasing the weight of teaching investment and educational effectiveness in professional title reviews and performance assessments. By initiating internal reforms and actively advocating for and responding to coordinated changes in the external evaluation system, fundamental obstacles to research-based education can be cleared.

New Pathways for Cultivating Talents Through Research in Jiangsu's Universities under the "Double-High Synergy" Initiative

The advancement of the "Double-High Synergy" initiative presents a historic opportunity for Jiangsu's universities to address the three core challenges in cultivating talents through research: difficulty in fostering innovative thinking, difficulty in cultivating interdisciplinary talent, and difficulty in reforming research evaluation. Through systematic institutional innovation, it has opened up new prospects for deepening the integration of research and education, as well as industry-academia collaboration.

3.1 Building Integrated Industry-University-Research Learning Scenarios and Reconstructing the Curriculum through Research Practice

Guided by the "Double-High Synergy" policy, universities and enterprises located in high-tech zones are building integrated industry-university-research scenarios based on authentic technical challenges and cutting-edge applications, exploring long-term and stable project-based teaching and interdisciplinary talent cultivation models .

Leveraging this opportunity, Jiangsu's universities can vigorously develop "project-based courses." By engaging with real-world industrial problems, they can transform high-quality research resources into teaching resources, promptly converting frontier industrial issues into teaching cases or experimental projects for undergraduates. With sustained support from competent authorities, Jiangsu's universities are expected to achieve a systematic innovation of their undergraduate curriculum systems and talent development plans within several years.

The "Policy Guideline List" supports pilot units of the "Double-High Synergy" in focusing on new tracks for innovation and entrepreneurship activities, expanding student participation by increasing quotas for competitions and similar activities . The

"Reform Guidance List" encourages universities to explore the acceptance of practical achievements obtained by students through the "Double-High Synergy" as substitutes for traditional graduation theses. This measure breaks the rigid constraints of the traditional curriculum system, aligning talent cultivation more closely with the needs of industrial innovation practice. More importantly, it induces a fundamental shift in the learning model for students participating in the "Double-High Synergy": from passively receiving knowledge to actively integrating knowledge, honing critical thinking, and nurturing innovative ability through solving complex real-world problems.

3.2 Implementing a Two-Way Flow Mechanism for Talent between Universities and Enterprises to Strengthen the Supervisor Team for Research-Based Education

The "Double-High Synergy" supports pilot universities in implementing a "dual appointment" system for faculty and enterprise experts according to relevant policies, exploring dual-position and dual-assessment mechanisms, and jointly conducting explorations of talent introduction models such as "university recruitment with shared usage" and "university appointment with enterprise use" with paired high-tech zones.

This two-way flow mechanism effectively resolves the incentive issues for university faculty engaging in enterprise practice while also providing a channel for industry experts to teach in universities. It breaks down the barriers to talent flow between universities and enterprises, achieving shared and optimized allocation of human resources. Universities can seize this opportunity to flexibly recruit top engineers and technical directors from enterprises in high-tech zones on a large scale to serve as industry mentors. These mentors can form joint supervision teams with internal academic supervisors, providing students with multidisciplinary perspectives and insights into industrial frontiers, thereby strengthening the team for cultivating talents through research.

3.3 Promoting Mutual Opening of University-Enterprise Research Platforms and Expanding the "Testing Ground" for Research Training

The "Double-High Synergy" encourages universities to treat paired high-tech zones as "testing grounds" for reform. Universities should proactively integrate key industrial innovation links, such as proof-of-concept and pilot testing, into student research training.

For instance, leveraging policy advantages, universities can guide student teams to conduct innovative exploration based on proof-of-concept platforms or participate in joint R&D projects in national or provincial key laboratories established in collaboration with high-tech zones. This type of research practice, which spans the entire innovation chain and process, is a core pathway for cultivating students' higher-order innovative abilities to cope with uncertainty, and to courageously explore and create.

3.4 Strengthening Discipline-Industry Collaborative Development for Forward-Looking Layout of Academic Programs

The "Double-High Synergy" policy promotes the establishment of a two-way interaction mechanism between "industrial clusters" and "disciplinary clusters," requiring high-tech zones and universities to jointly define future industrial directions and discipline development paths.

For example, it encourages universities to make extraordinary efforts to establish emerging interdisciplinary majors not listed in the standard catalog and to strengthen the connection between application-oriented programs and industrial and regional development. Disciplines involved in successful collaborations between pilot universities and paired high-tech zones can be directly designated as provincial key disciplines for the "15th Five-Year Plan" period. Special funds for building a strong education province will be prioritized to support disciplinary programs from pilot universities that demonstrate significant collaborative effectiveness. This policy design strongly incentivizes universities to focus on the future development needs of industries in high-tech zones, break through the limitations of traditional disciplinary catalogs, and provides a solid institutional guarantee for cultivating interdisciplinary innovative talent.

3.5 Establishing a Multi-dimensional Research Evaluation System and Improving Incentives for Research-Based Education

The "Double-High Synergy" systematically advances the reform of research evaluation by constructing a multi-dimensional evaluation indicator system and a classified assessment mechanism, thereby addressing the long-standing problems of a single evaluation standard and insufficient incentives in research-based education.

The "Double-High Synergy" supports faculty from pilot universities in taking part-time positions in paired high-tech zone enterprises or starting businesses based on their scientific and technological achievements. Their performance in these roles is jointly evaluated by the university and the high-tech zone, and is recognized and reflected in aspects such as position appointments, professional promotion, and research performance evaluation. Under equal conditions, priority will be given to recommending them for relevant talent programs, establishing a dual-track evaluation path that values both industrial contribution and academic development.

Simultaneously, the "Double-High Synergy" also supports pilot high-tech zone sci-tech innovation platforms in exploring the establishment of classified evaluation standards for scientific and technological talent, increasing the assessment weight for achievements such as technology transfer, industry-university-research collaboration, and service to local advantageous industries. This forms a distinctive evaluation system different from traditional metrics focused solely on papers and grants.

In essence, this establishes a multi-dimensional evaluation system that emphasizes both quality and contribution, guiding faculty towards engaged, organized research and translation. For students, the policy supports pilot universities in recognizing the practical results they achieve through participation in the "Double-High Synergy," and using these as important references for graduate recommendation admission, awards evaluation, and credit recognition. This means student course

outcomes can be a business plan, a solution to a technical problem, or a product prototype; practical achievements can even replace traditional graduation theses. This competency- and contribution-oriented evaluation method can comprehensively stimulate students' enthusiasm for participating in research and industrial practice, ensuring the cultivation of innovative thinking is grounded in addressing genuine industrial problems.

Conclusion and Outlook

Through systematic institutional innovation, the "Double-High Synergy" provides a comprehensive solution for Jiangsu's universities to overcome the challenges in cultivating talents through research. It reconstructs the curriculum system through integrated industry-university-research scenarios, driven by real-world problems to transform teaching models; breaks down university-enterprise barriers through a two-way talent flow mechanism, building cross-disciplinary supervisor teams; transforms high-tech zones into practical fields for research training through mutual platform opening; enables forward-looking layout of academic programs through discipline-industry collaboration; and reshapes incentive mechanisms through multi-dimensional evaluation reform. This series of measures fully integrates the developmental needs of university research-based education with the policy requirements of the "Double-High Synergy," forming a closed-loop support system encompassing curriculum, faculty, platforms, disciplines, and evaluation.

Looking forward, Jiangsu's universities should focus on promoting deepened development in three aspects, breaking down administrative barriers to establish regular collaborative governance mechanisms, constructing standardized processes for transforming knowledge achievements into teaching resources, and establishing an innovative competence-centered evaluation system for educational quality.

Through these efforts, the "testing grounds" of the "Double-High Synergy" can be transformed into a nationally exemplary hub for cultivating innovative talent, providing a replicable and scalable Jiangsu model for higher education reform in the new era.

Declarations

Availability of data and materials

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Reference

[1] General Office of the People's Government of Jiangsu Province. (2025). Implementation opinions on promoting collaborative innovation and development of high-tech zones and colleges and universities. Jiangsu Provincial

- People's Government. http://www.js.gov.cn/art/2025/7/16/art_46144_11602534.html
- [2] Jiangsu Provincial Department of Science and Technology. (2025). Notice on the issuance of the "Double High Synergy" policy guide list and the "Double High Synergy" reform guide list. http://kxjst.jiangsu.gov.cn/art/2025/9/17/art_82539_11642644.html
- [3] Xi, J. (2018). Speech at the 19th academician conference of the Chinese Academy of Sciences and the 14th academician conference of the Chinese Academy of Engineering. *People's Daily*, p. 002.
- [4] Zhou, G., Zhou, X., Qin, H., et al. (2018). Integration of science and education in academic education-A framework for supporting high-quality undergraduate teaching with high-level scientific research. *China Higher Education Research*, (08), 11–16.
- [5] Zhou, G., Jiang, J., Wang, S., et al. (2018). Educational-science-education integration dilemma and public policy adjustment of university scientific research. *Research in Higher Education of Engineering*, (01), 88–94.
- [6] Wu, Y. (2018). Building China's golden standard course. *China University Teaching*, (12), 4–9.
- [7] Wang, Z., & Chang, L. (2022). Beyond the discipline: The institutional dilemma and the improvement of interdisciplinary construction. *Journal of Higher Education*, 43(05), 26–34.
- [8] Zhang, X., & Liu, B. (2023). Interdisciplinary talent cultivation mechanism: Theoretical logic, practical problems and optimization paths. *University Education Science*, (06), 43–51.
- [9] Zeng, Y., Huang, Y., Xiang, G., & Huang, T. (2020). Design and practice of UESTC-New E3 plan for emerging engineering: Starting from the freshman project courses. *Research in Higher Education of Engineering*, (01), 14–19.
- [10] Huang, T., Huang, Y., & Yang, J. (2021). New engineering education through cultivating talents via research: Understanding, reflection, and practice. *China University Teaching*, (07), 33–39.