

An exploration of the mechanism for cultivating graduate students through the integration of science and education in normal universities

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Abstract. Graduate education at normal universities is at a critical juncture, transitioning from a traditional teaching-oriented approach to high-level, research-focused training; the integration of science and education serves as the core driving force for the high-quality development of graduate education in the new era. First, by exploring the inherent logic of integrating science and education in normal universities, this paper proposes an ideal model for an education mechanism characterized by the intertwining of a "double helix". Second, it examines the dilemmas arising from the failure of current integration mechanisms, identifying systemic issues such as communication breakdowns in macro-level organizational governance, the distortion of the mentoring role at the meso-level, and the divergence between disciplinary research and the "normal" (teacher-training) ethos at the micro-level of knowledge transformation. Third, it constructs a three-dimensional, interconnected education mechanism: at the macro level, it achieves the educational conversion of resources from "major platforms and projects" through the "strong coupling" of governance structures; at the meso level, it restores the mentoring function through a diversified evaluation system; and at the micro level, it establishes a clinical practice-oriented teacher education model while deepening "integrated design". Ultimately, this approach aims to resolve the persistent problem of the disconnect between scientific research and teacher education, providing both a theoretical foundation and practical pathways for cultivating outstanding research-oriented teachers who possess a capacity for original innovation and the ability to translate knowledge into educational practice.

Keywords: integration of science and education, normal universities, postgraduate education, talent cultivation mechanism

1. Introduction

1.1. Policy guidance

Currently, higher education in China has historically entered a new stage characterized by intensive development and high-quality construction. Consequently, the cultivation quality of high-level innovative talent is becoming a critical metric for measuring national core competitiveness. However, Chinese

universities have long been embroiled in debates regarding the "decoupling of research and teaching" (colloquially known as the "two skins" phenomenon). As noted, "a prominent issue in current higher education is the lack of effective integration between university teaching and research to jointly serve talent cultivation" [1]. Consequently, exploring the mechanisms of talent cultivation through the integration of research and teaching has emerged as an imperative of our times. The philosophy of research-teaching integration "has become a fundamental concept and core component of the intensive development of higher education". Specifically, "educating through the integration of research and teaching refers to leveraging the synergistic advantages of both research and teaching resources to cultivate talent, which constitutes the core educational philosophy of modern universities". Ultimately, "the starting point and ultimate goal of the research-teaching integration philosophy consistently remain anchored in talent cultivation" [2].

As early as 1995, China launched the national development strategy of "Invigorating the Country through Science and Education", emphasizing the pivotal role of universities in fundamental research and elevating the integration of research and teaching within higher education institutions to the level of a national strategy. In 2020, three national ministries, including the Ministry of Education, jointly issued the *Opinions on Accelerating the Reform and Development of Postgraduate Education in the New Era* (hereinafter referred to as the *Opinions*). The document explicitly stipulated the need to "improve mechanisms for talent cultivation through the integration of research and teaching, and enhance the knowledge-innovation capacity of academic degree postgraduates", while emphasizing the imperative to "strengthen systematic research training and leverage large-scale teams, major platforms, and high-impact projects to support high-quality postgraduate cultivation" [3]. In 2022, to further advance the "Double First-Class" initiative (world-class universities and first-class disciplines), three national ministries, including the Ministry of Education, jointly issued the *Several Opinions on Deepening the Advancement of World-Class Universities and First-Class Disciplines*. The document proposed refining university innovation systems, deepening talent cultivation through the integration of research and teaching, and addressing the insufficient capacity to supply high-level innovative talent [4]. This series of robust policy directives not only establishes high-level scientific research as a core supply source in postgraduate education, but also reshapes the evaluation benchmarks for high-level talent cultivation from a national strategic perspective. The underlying rationale of these policies lies in breaking the longstanding impasse caused by the dichotomy between research and teaching. Through institutionalized structural integration, they aim to directly convert the frontier momentum of technological innovation into an endogenous dynamic for talent cultivation.

As this backdrop, focusing on foundational disciplines—such as literature, history, philosophy, mathematics, physics, and chemistry—oriented toward strengthening original innovation capacity, and implementing specialized programs for high-level talent cultivation have emerged as the central theme of graduate education reform in the new era. This series of policy directives not only provides a rationale of legitimacy for universities to dismantle institutional barriers, but also presents a profound demand for paradigm transformation to normal universities, which bear the dual responsibility of conducting research in basic disciplines and cultivating high-caliber teaching faculty.

1.2. Practical shift

Driven strongly by policy dividends, normal universities are undergoing a practical shift—transitioning from traditional, experience-driven "pedagogical transmission" toward "academic leadership" underpinned by big science and large-scale teams. This profound leap in institutional function requires normal universities to transcend a singular reliance on "pedagogical reverence", solidify their academic foundation at the very source

of knowledge production, and cultivate "research-oriented educators" who possess both original innovation capacity and wisdom in pedagogical transformation.

This paradigm shift from the periphery to the center endows the integration of research and teaching in normal universities with a unique "double helix" dynamic. Rather than merely chasing higher research metrics, it seeks to convert breakthroughs in original innovation within basic disciplines into disciplinary depth that empowers the professional development of future outstanding teachers.

In essence, this practical shift represents a fundamental reshaping of the traditional core of teacher education. It demands that universities achieve a deep coupling between the logic of knowledge production and the logic of pedagogical transmission within an integrated cultivation framework, thereby forging a novel pathway for the professionalized development of high-level teacher education.

1.3. Statement of the problem

However, at the intersection of organizational transformation and paradigm shifts, the practical shift of normal universities is encountering unique epistemological conflicts and practical dilemmas, resulting in significant structural friction between macro policy expectations and the execution logic at micro-organizational grass roots.

At its core, this structural friction manifests as institutional misalignments across three dimensions. First, there is the divergence of organizational goals: the long-cycle, flexible logic of postgraduate talent cultivation envisioned by national policy collides sharply with the short-term, rigid logic of "academic tournaments" pursued by micro-organizational units under discipline evaluation pressures. Consequently, research resources fail to substantively spill over into the educational process. Second, there is the alienation of actor identities: under the constraints of quantitative university evaluations, advisors drift from being "educational mentors" into "research entrepreneurs", while postgraduates are alienated from "central agents of learning" into "academic labor", causing the idealized faculty-student academic community to devolve into a mere formality. Finally, there is the rupture of knowledge-transformation contexts: the highly specialized and decontextualized modes of knowledge production in major cutting-edge projects lack effective compatibility with the highly complex needs of basic education settings, which urgently demand recontextualized pedagogical translation. These compounding institutional blockages constitute an unsponaneous "structural friction" between macro policy expectations and micro-level execution, causing research-teaching integration at the operational frontline to sink into a structural impasse where "resource abundance" coexists with "educational dilution".

In light of these shifts and dilemmas, the core questions facing normal universities are: How to dismantle the institutionalized ailment of the "decoupling of research and teaching"? How to effectively bridge the intrinsic tension between "academic character" and "pedagogical character", preventing original innovation capacity from degenerating into decontextualized data stacking? To address these issues, it is imperative to thoroughly explore the underlying theoretical logic of talent cultivation through research-teaching integration in normal universities. Furthermore, by examining the current functional breakdown of research-teaching integration mechanisms in normal universities, this study aims to construct an integrated, three-tiered collaborative cultivation mechanism encompassing macro-level governance, meso-level driving forces, and micro-level practices.

2. The inherent logic and mechanism model of research-teaching integration in normal universities

The integration of research and teaching in normal universities embodies a unique organizational logic and pedagogical paradigm. Its core mechanism is not a unidirectional, linear support of research projects for teaching activities; rather, it dismantles the traditional notion of a dichotomy between research and teaching. It shifts the primary objective from mere resource complementarity to a return to the fundamental essence of knowledge innovation and talent cultivation, establishing a co-resonant "double helix" evolutionary path between the depth of disciplinary research and the breadth of pedagogical transformation.

In essence, this reflects a deep structural coupling and symbiosis between the logic of knowledge production and the logic of pedagogical transmission. Specifically, the logic of knowledge production inherits the evolutionary trajectory of knowledge production modes in modern research universities, whereas the logic of pedagogical transmission governs the flow, restructuring, and embodiment of knowledge from its academic source to educational practice settings. By shaping innovation capacity through the logic of knowledge production and refining pedagogical wisdom through the logic of pedagogical transmission, research resources are deeply coupled and transformed into educational momentum, ultimately driving a substantive leap for postgraduates from academic engagement to professional educational competency.

2.1. The first helix: the logic of knowledge production and the cultivation of original innovation capacity

From the perspective of theoretical genealogy, this logic is deeply rooted in Michael Gibbons' landmark theory regarding the "transformation of knowledge production". In the late 20th century, the "Mode 2" knowledge production theory advanced by Gibbons et al. revealed a paradigm shift in knowledge production—transitioning from traditional Mode 1, characterized by disciplinary dominance, academic autonomy, and structural stability, toward Mode 2, marked by transdisciplinary collaboration, application-oriented contexts, and organizational embedding [5].

Within the foundational logic of postgraduate cultivation, the first helix represents an individual's deep embedding in specialized disciplinary research and the foundational construction of academic literacy. In the specific context of normal universities, this logic of knowledge production is invested with a dual mission. It is not only an epistemological process wherein individuals participate in advisors' high-level research activities, adhere to academic norms, and acquire cutting-edge disciplinary knowledge, but also an ontological process through which they hone scientific thinking within interdisciplinary and large-team collaborative settings.

By entering national- and provincial-level key laboratories or key philosophy and social science research bases, postgraduates undergo systematic training in original innovation through their active engagement in tackling major research initiatives. From a pedagogical perspective, the educational function of these university research platforms extends beyond serving as a material foundation for research outputs; rather, they constitute highly institutionalized "Communities of Practice". By constructing an educational field centered on "Legitimate Peripheral Participation" [6], these platforms confer legitimacy upon postgraduates as "academic novices"—even when, during the early stages of major projects, they operate within a peripheral and auxiliary work ecology. Through continuously internalizing the scientific spirit, logical deduction, and experimental paradigms of advisors and senior researchers, postgraduates progressively achieve a professional identity transition from "academic novices" to "independent researchers" through these communal interactions.

Therefore, discursively aligning the policy mandate of "strengthening original innovation capacity" with the "disciplinary depth" of normal universities reveals that original innovation is not merely the logical starting point of postgraduate education, but the vital lifeline for the professional development of teacher education. Consequently, the logic of knowledge production constitutes the epistemological starting point of the double helix model. Without the robust support of original innovation in foundational disciplines, talent cultivation in normal universities will inevitably become "water without a source" due to insufficient disciplinary accumulation, thereby falling short of sustaining the ambitious vision of cultivating high-caliber, research-oriented teachers. Ultimately, this training in original innovation aims to enhance postgraduates' academic literacy in identifying novel problems and constructing new theories within their respective fields, thereby providing a continuous supply of innovation and knowledge for the subsequent second helix of pedagogical transmission.

2.2. The second helix: the logic of pedagogical transmission and the identity reshaping of research-oriented teachers

In his theory of code and symbolic control, Basil Bernstein posits an institutional division in society between the "field of production" and the "field of reproduction" (or transmission) of knowledge, emphasizing that the transformation of knowledge from the former to the latter inevitably undergoes a rule-driven restructuring process termed "recontextualization" [7]. Furthermore, Lee Shulman articulated the conceptual core of "Pedagogical Reasoning and Action" [8] focusing on how actors transform abstract subject matter knowledge into accessible pedagogical representations—a process central to Pedagogical Content Knowledge (PCK).

This precisely highlights the distinctiveness of normal universities, wherein postgraduate cultivation must focus on translating cutting-edge academic knowledge into the professional competencies of future outstanding teachers, with postgraduates' innovative capacity ultimately being realized within educational settings. In normal universities, the second helix is characterized by a paradigm transition from "original innovation" to "pedagogical transmission". The core mechanism of this helix lies in guiding postgraduates through a secondary transformation of knowledge. That is, postgraduates must not only acquire the capacity to explore disciplinary frontiers—understanding "what is"—but also hone, through educational practice, the wisdom of pedagogical transformation that enables learners to comprehend "why it is so", thereby achieving the sublimation of "pedagogical character".

Under this logic, research-teaching integration ceases to be an isolated endpoint of disciplinary research and instead serves as the logical starting point for pedagogical transformation. By guiding postgraduates to transcend the long-standing, "decontextualized" and closed state of cutting-edge scientific research—and using human cognitive laws alongside basic education practices as reference benchmarks—it enables them to deconstruct advanced, abstract scientific knowledge and transform it into inspiring educational knowledge. This logic of transformation thoroughly shatters the traditional stereotype that reduces teaching to low-level knowledge repetition, endowing the instructional process with a highly professionalized and creative character. By subjecting the advanced academic knowledge acquired in the first helix to processes of decontextualization and recontextualization, postgraduates achieve an embodied integration of scientific spirit and pedagogical persona. This process epitomizes the dynamic emergence of Shulman's "Pedagogical Content Knowledge" (PCK) within practical research endeavors.

Furthermore, this logic of transformation requires postgraduates to undergo a role evolution during their cultivation—transitioning from "pure academic researchers" into "research-oriented educators" and transferring their mindset from research-oriented thinking to pedagogical thinking. Leveraging practical platforms such as the "Excellence Teacher Training Plan 2.0", the second helix emphasizes that postgraduates

should examine instructional settings through the lens of scientific research. It encourages them to translate logical deduction, empirical evidence, and innovative thinking derived from the research process into analytical tools for addressing authentic educational problems. This integrated "research-and-teaching" transformation pathway effectively resolves the persistent dilemma of the "decontextualization of academic research" in teacher education. It ensures that research outputs are no longer confined within academic publications, but rather flow through the micro-mechanisms of educational practice. In other words, the second helix not only equips postgraduates with profound academic literacy, but also reciprocally stimulates original innovation in the first helix through the feedback mechanisms of pedagogical transformation.

2.3. The ideal model of the research-teaching integration mechanism under the intertwining of the double helix

Based on the inherent double-helix logic of knowledge production and pedagogical transmission, the effective operation of research-teaching integration in normal universities hinges heavily on a systemic mechanism model featuring "macro-level resource allocation, meso-level motivation stimulation, and micro-level contextual transformation". The ideal state of this mechanism is characterized by three synergized dimensions: at the macro level, governance structures provide institutionalized cultivation pathways via "major platforms and high-impact projects", thereby channeling research momentum into the educational field; at the meso level, evaluation rules establish a balanced guidance matrix combining rigid constraints with flexible incentives, driving advisors' academic capital to feed back into graduate instruction; and at the micro level, curriculum and practice chains facilitate students' embodied knowledge transformation and clinical pedagogical diagnosis. Fulfilling their respective roles while standing in reciprocal causality, these three elements jointly constitute a dynamic, closed-loop ecological system for the research-teaching integration mechanism in its normative state.

Under this ideal model, knowledge innovation serves as a living fountainhead, continuously supplying theoretical nourishment and academic grounding for pedagogical transformation. Consequently, original innovation breaks free from the predicament of being "siloe" away from educational practice, transforming into an endogenous core engine driving the sustained career growth of outstanding teachers. Simultaneously, authentic problems and complex contexts emerging from the field of educational practice reactivate original innovation within academic research via reverse feedback mechanisms. This feedback loop ensures that pedagogical transformation is no longer reduced to low-level knowledge repetition or a simple transfer of experience, but becomes a highly professionalized act of creation grounded in advanced scholarship. In summary, this bidirectional flow mechanism enables "research" and "teaching" to establish a self-evolving and mutually empowering logical closed loop through deep coupling. Ultimately, within an integrated cultivation framework, this lays a solid theoretical bedrock for developing high-caliber postgraduates in normal universities who possess both profound academic depth and wisdom in pedagogical transformation.

3. Practical dilemmas of research-teaching integration mechanisms in normal universities

When the ideal mechanism model is projected onto actual university settings, it faces dual constraints from the external environment and organizational inertia. Consequently, this cultivation mechanism suffers from ruptures and functional alienation across multiple links, falling into a practical impasse characterized by a decoupling between macro policy expectations and micro-organizational execution.

3.1. Loose coupling in macro-governance mechanisms and ruptures in resource transmission

According to Karl Weick's Loose Coupling Theory, while units within an organization are interrelated, they nevertheless retain their distinct independence and logical integrity, resulting in linkages characterized by fragility, latency, and non-linearity [9].

Within the organizational field of research-teaching governance in normal universities, this "loose coupling" centrally manifests as a structural alienation between administrative evaluation logic and academic-pedagogical logic. In essence, the loose coupling of the research-teaching relationship represents a filtering out of educational functions by academic logic. Because internal university evaluation rules, resource allocation, and professional identity lean heavily toward research projects, the educational function is relegated to the organizational periphery.

For example, university research management offices and graduate education departments often operate under two mutually incompatible standards. The former is driven by "major projects" and ranking-oriented outputs, focusing on enhancing disciplinary competitiveness; the latter prioritizes the standardization of cultivation schemes and the quality of degree conferral, focusing on procedural legitimacy within the educational process. This coupling mechanism yields a form of "symbolic compliance" at the policy level: although universities issue numerous documents promoting research-teaching integration—thereby achieving text-level compliance with national policies—the evaluation criteria remain bound to hard metrics such as publication counts. The divergence between the two evaluation systems regarding goal orientation and resource allocation leaves policies "suspended" as they cascade down to the operational level of advisors, owing to a lack of substantive incentives and constraints. Consequently, within specific faculty-student interactions and classroom settings, research retains its isolated and self-contained operational logic. High-level research platforms are thus narrowed into mere arenas of knowledge production rather than collaborative fields of talent cultivation, ultimately failing to generate the expected educational spillover effects.

This disconnect in governance logic directly leads to a rupture in the transmission of research-teaching resources. In practice, postgraduates' research participation exhibits distinct features of "marginalization" and "fragmentation". Although embedded within high-level research teams, they are often excluded from core decision-making and systematic training due to administrative barriers and evaluation misalignments, being relegated to "academic auxiliaries" who execute repetitive and mechanical tasks. Research platforms, which ought to serve as conduits for cultivating original innovation capacity, struggle to translate into postgraduates' systematic academic literacy within a loosely coupled institutional environment. Consequently, the policy objective of "improving mechanisms for talent cultivation through the integration of research and teaching" suffers severe institutional attenuation when cascading down to the organizational grass roots.

3.2. Interest disciplining in meso-evaluation mechanisms: the alienation of advisors' pedagogical responsibilities

The loose coupling at the organizational governance level further triggers the alienation of advisors' pedagogical responsibilities at the level of individual action. This phenomenon can be profoundly explained through Anthony Giddens' Structuration Theory. The theory emphasizes the "duality of structure", positing that social structures (composed of rules and resources) are both the product of actors' practices and the medium that constrains and enables subsequent actions [10]. Within the field of postgraduate education in normal universities, a profound interplay is unfolding between the prevailing evaluation structure and the individual actions of advisors.

Within the prevailing evaluation structures of normal universities, assessment systems nominally centered on original innovation capacity are often alienated into rigid academic metrics, such as publication volume in

core journals. Such structural pressures profoundly shape and discipline advisors' logic of action. To secure scarce resources (e.g., funding, student admission quotas) amidst fierce academic competition, advisors are compelled to disproportionately skew their limited energy toward quantifiable, quick-yielding research projects. They tend to replicate legacy modes of academic reproduction, thereby unconsciously reproducing and reinforcing the structural logic of "publication-centricity", while neglecting the cultivation of the academic literacy and pedagogical practice skills that postgraduates require as future educators.

In this process, the role of advisors as primary pedagogical agents has also undergone alienation. Advisors, who ought to serve as the key nexus for research-teaching integration, find their roles distorted under the pressure of evaluation structures. Evolving into "research project managers", they often treat postgraduates as human resources and academic labor to drive research outputs, rather than educational subjects requiring dedicated cultivation.

This "structural deviation" at the level of practice engenders a grave empirical dilemma: while postgraduates in normal universities engage in high-intensity research alongside their advisors, their professional growth as "future teachers" is marginalized, creating a detachment between advisors' research outputs and students' developmental processes. Lacking institutional incentives for translating research into educational outcomes, advisors have little motivation to guide postgraduates in exploring how research findings can feed back into teaching. Consequently, a rift opens between postgraduates' professional identity construction as "future teachers" and their academic growth. Failing to develop the disciplinary understanding and translational wisdom required of outstanding teachers, the cultivation mechanism sinks into a quagmire where "flourishing academic output" coexists with the "dilution of educational efficacy".

3.3. Contextual absence in micro-transformation mechanisms: the binary departure between disciplinary research and pedagogical character

Within the field of normal universities, knowledge production is not the ultimate destination; rather, the pedagogical transformation of knowledge constitutes its core mission. The cultivation of postgraduates in normal universities ought to be a continuous process bridging "disciplinary research" and "pedagogical transformation". However, under the dual constraints of governance structures and action logics, research-teaching integration ultimately encounters a bottleneck of "contextual absence" at the level of knowledge transformation. The failure of this crucial link is rooted in the "stripping of context" during the process of knowledge production.

Driven by "large teams and major projects", postgraduates may receive systematic research training in foundational disciplines and even yield high-level academic outputs, with the cutting-edge knowledge they acquire becoming highly specialized. However, high-level research platforms within university settings often evolve into closed bases for knowledge production rather than opening up substantively as educational spaces for postgraduates. Although embedded in "large teams", postgraduates predominantly perform mechanical and repetitive auxiliary tasks, causing systematic training in scientific thinking to become a mere formality.

Particularly critical is that within current research-teaching integration practices across normal universities, the excessive pursuit of academic metrics often renders the process of scientific research highly "decontextualized". Advanced knowledge generated through research remains locked within precise laboratory data or highly abstract theoretical models, devoid of meaningful connections to authentic educational settings. This gives rise to a structural impasse in talent cultivation—namely, being "theoretically proficient yet pedagogically ineffective, or pedagogically adept yet academically superficial". When confronted with complex and dynamic instructional scenarios, postgraduates struggle to translate laboratory-bound advanced

knowledge into classroom-based pedagogical wisdom, nor can they internalize scientific spirit into an inspiring pedagogical persona.

In summary, this decontextualized mode of research leads to a substantive divergence between disciplinary research and pedagogical character within normal universities. This contextual vacuum in the knowledge transformation process creates a profound disconnect between disciplinary research and educational practice. Consequently, normal universities—charged with high-quality postgraduate cultivation—risk being reduced to sites of singular academic output, thereby eroding their social mandate as training bases for research-oriented teachers. Ultimately, this precipitates the failure of the research-teaching integration mechanism at the terminal node of knowledge transmission, constraining postgraduates' paradigm transition from "pure academic researchers" to "outstanding research-oriented educators".

4. Paradigm reshaping: systemic construction of research-teaching integration mechanisms in normal universities

Addressing the dilemmas analyzed above—namely organizational looseness, behavioral deviations, and bottlenecks in knowledge transformation—normal universities urgently need to build an integrated, tripartite linkage mechanism that synergizes macro-level governance, meso-level driving forces, and micro-level practice.

4.1. Macro level: achieving the educational transformation of resources through "tight coupling" of governance structures

First, normal universities should establish a collaborative governance architecture characterized by strategic alignment. Addressing the loose coupling between administrative logic and academic-pedagogical logic outlined above, the primary task is to achieve "tight coupling" in governance structures. Guided by the principle of strategic alignment, normal universities must dismantle functional barriers between research management and academic administration departments, thereby ensuring that "major platforms and high-impact projects" generate substantive educational spillover effects. To this end, universities should establish a "Collaborative Committee for Research-Teaching Integration" led by senior university leadership. This committee will holistically coordinate special funds across disciplinary development, scientific research, and talent cultivation, ensuring that research momentum smoothly cascades down to the educational grass roots.

Second, normal universities should construct a resource allocation mechanism based on "educational contribution rates". At the level of resource allocation, rigid constraints must be established to enforce the translation of research resources into educational efficacy. Specifically, national- and provincial-level key laboratories should be mandated to designate dedicated research training slots for postgraduates, explicitly tying their degree of openness and resource utilization efficiency to annual laboratory evaluations and supplementary resource allocations. Through such institutional constraints, internal transmission ruptures within the organization can be effectively eliminated, ensuring that high-level research platforms cease to function as isolated arenas for academic output, but rather become vital engines driving the continuous generation of postgraduates' original innovation capacity.

4.2. Meso level: establishing diversified evaluation systems and educational communities

First, universities should advance multidimensional structural reforms in advisor evaluation. A governance shift at the macro level must be complemented by the structural reshaping of meso-level evaluation levers to rectify the alienation of advisors' behaviors under structural pressure. Overcoming the behavioral inertia of

"prioritizing research over teaching" requires reconstructing the system of rules governing advisors, thereby achieving logical alignment between research output and students' professional development. This necessitates that universities establish a diversified advisor evaluation system. While continuing to emphasize original innovation capacity, institutions must incorporate pedagogical contributions—such as "translating research outcomes into instructional case studies", "integrating postgraduates into large-team collaborative projects", and "mentoring students in solving real-world educational and instructional challenges"—into the core metrics for professional title promotion and performance appraisal.

Second, universities must guide the academic community back to its fundamental essence as an educational community. This reshaping of the evaluation structure aims to prompt advisors to redefine postgraduates from mere "academic labor" into equal subjects within an "academic-pedagogical community". When pedagogical investment is granted a substantive institutional premium, advisors gain greater impetus to spontaneously foster students' professional persona and nurture their teacher-education ethos while leading them to tackle tough problems in foundational disciplines. By leveraging this restructured evaluation framework, advisors are prompted to undergo a role reversal—transitioning from mere "research project managers" back into "pedagogical mentors"—thereby realizing the logical alignment between research output and students' professional growth.

4.3. Micro level: constructing a clinical practice-based teacher education model and deepening "integrated design"

First, universities should construct a clinical practice-based teacher education model with "action research" at its core. In its 2010 report, *Transforming Teacher Education Through Clinical Practice: A National Strategy to Prepare Effective Teachers*, the National Council for Accreditation of Teacher Education (NCATE) emphasized that the preparation of outstanding teachers should parallel medical training by placing clinical practice—grounded in authentic educational settings—at the very center of teacher education. This mandates strengthening university-school partnerships to dismantle the binary divide between theory and practice [11]. In 2024, the latest *Clinical Experiences Standards (Third Edition)*, released by the Association of Teacher Educators (ATE), further delineated 11 standards for the implementation of clinical practice models. This established a more refined quality benchmark for clinical mentorship, clinical site partnerships, and postgraduates' reflective clinical practice within complex educational contexts [12].

Therefore, normal universities should establish a clinical practice-based teacher education model with "action research" at its core. This model enables postgraduates to bring laboratory research tasks directly into authentic K-12 classrooms, ensuring that original innovation in foundational disciplines ceases to be a decontextualized accumulation of data and is instead transformed into intellectual tools for solving real-world educational problems. Ultimately, the research-teaching integration mechanism achieves reconciliation at the micro level, resolving the longstanding predicament of divergence between disciplinary research and pedagogical contexts.

Second, universities must deepen the construction of embodied literacy within an "integrated design". Regarding the architecture of teacher education curricula, the integration principle of "basic theory—scientific experimentation—practical application" governs the foundational orientation of specialized course development, positioning practical courses as a logically and professionally coherent extension of theoretical and experimental coursework. The educational practicum curriculum serves as an essential conduit for preservice teacher education to transition from abstract theoretical ideologies and simulated experiential states to authentic, situated experiences. Through this immersion, preservice teachers cultivate embodied pedagogical intentional experiences. This process of constructing embodied literacy entails a profound

morphological transition. Postgraduates not only temper their scientific spirit through involvement in university research projects, but also accomplish the embodied construction of Pedagogical Content Knowledge (PCK) within clinical practices of "teaching through research". The cutting-edge disciplinary knowledge and research literacy acquired by postgraduates in the initial spiral remain largely disembodied "theoretical ideologies" or decontextualized "simulated experiential states" prior to stepping onto the podium. In contrast, the educational practicum under an integrated design thrusts postgraduates' "corporeal subjects" fully into the authentic basic education ecosystem. Amid authentic, situated experiences fraught with uncertainty, teachers are compelled to mobilize their full sensory apparatus, academic accumulation, and emotions to diagnose and resolve real-world educational pain points. Through such high-frequency clinical interactions and action research, advanced scientific research literacy begins to settle and transform into "pedagogical intentional experiences". In summary, an integrated design is no mechanical medley of curricular forms; by extending and synthesizing the complete continuum of "theory—experiment—application", it ensures that the scientific spirit and teacher-education ethos of high-level postgraduates are reconfigured through lived, bodily practice, ultimately achieving the construction of embodied literacy.

5. Conclusion

A systematic deconstruction across macro-governance, meso-level drivers, and micro-level practice reveals that the key to resolving the impasse of "strong research, weak teaching" in postgraduate education at normal universities lies in constructing a "double helix" coupling pathway wherein academicity and pedagogical character achieve co-resonance. By breaking organizational "loose coupling" through macro-level institutional incentives, reshaping evaluation structures at the meso level to restore advisors' core pedagogical responsibilities, and accomplishing the pedagogical transformation of knowledge at the micro level, universities can effectively drive the substantive conversion of research momentum into educational momentum, ultimately elevating the overall quality of postgraduate cultivation.

Ultimately, the construction of a research-teaching integration mechanism is not merely a physical reorganization of resources and space, but rather a profound synthesis of scientific spirit and educational ethos. Future postgraduate education reform must place greater emphasis on realizing the symbiosis and transformation of knowledge within authentic and complex educational settings. Normal universities must transcend traditional knowledge-transmission paradigms. By enabling postgraduates to engage in original innovation within foundational disciplines through the embodied practice of "integrated research and teaching", institutions can facilitate students' identity transformation and paradigm leap from academic novices to outstanding educators. Only then can normal universities truly establish a postgraduate cultivation ecosystem underpinned by both original innovation capacity and practical wisdom, thereby preparing high-level, exceptional talents capable of leading future educational transformations for the nation.

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