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Establishing a County-Level Teacher Supply Mechanism Aligned with Changes in School-Age Population

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Abstract: ***School-age population serves as a key variable influencing teacher resource allocation. Amidst the current wave-like fluctuations in school-age population, multiple inconsistencies exist between county-level teacher supply mechanisms and future demographic shifts. These include: temporal mismatches between static teacher staffing quotas and dynamic population fluctuations; spatial inconsistencies between rigid urban-rural teacher allocation patterns and the concentration of school-age populations in urban areas; structural disconnects between persistent teacher shortages and evolving educational needs of the school-age cohort; and the temporal mismatch between fragmented administrative management and complex demographic shifts. To address these four contradictions, this study proposes four strategies for counties: 1. Establish a dynamic staffing management and precision planning response system driven by digital and intelligent technologies; 2. Innovate a new ecosystem for urban-rural teacher allocation and incentive safeguards that fosters shared development; Implementing targeted transformation strategies for optimizing teacher workforce structure and enhancing professional quality; and Refining modern education governance and comprehensive support mechanisms through multi-stakeholder collaboration.***

Keywords: County-level education, Changes in school-age population, Teacher supply mechanisms**.**

1. The Essence of the County-Level Teacher Supply Mechanism

The term “teacher supply mechanism” can be understood as comprising two parts: “teacher supply” and “mechanism.” The word “mechanism” is translated from the English “mechanism,” which corresponds to the Greek ‘mechane’ (a device or tool for performing an action) and “mechos” (a means or method for accelerating an action) [1]. Thus, the “mechanism” here is a concept viewed through a mechanistic lens. Also known as a mechanism, its original meaning refers to the structure and working principles of a machine [2]. Alternatively, it denotes the interconnected forms of components within a machine’s construction, their mutual interactions, and regulatory mechanisms during operation [3]. This constitutes the original meaning of “mechanism,” later adopted by multiple disciplines with expanded connotations. For instance, the Modern Chinese Lexicon defines “mechanism” as: Originally referring to the structure and working principles of machinery, it was borrowed by biology and medicine to denote the operational modes and interrelationships among parts within an organism. It now broadly signifies the organization of things and the laws governing their operation and change [4].

Within the philosophical discourse system, the Encyclopedia of Literature, History, and Philosophy defines “mechanism” as: “The internal structure and mode of action that constrains, initiates, and drives the motion, transformation, and development of things. As a philosophical concept, it encompasses the movement quality and interrelationships concerning the structure of things, the mutual relations among their constituent parts, and the various change processes occurring between them.” [5] Within the discourse of political science, the most fundamental meaning of mechanism encompasses the following characteristics: First, it emphasizes inherent regularity, distinguishing itself from mere descriptive accounts of phenomena; second, it stresses holistic integrity, focusing on exploring the connections and interactions among the constituent parts of the research subject; Third, it emphasizes authority, as mechanisms may originate from spontaneous or artificial sources, but once established, they possess formidable binding force [6]. In essence, a mechanism is the aggregate of all systems, institutions, methods, and customs upon which the stable development of a system or the operation of an entity relies [7]. In sociological terms, the concept of “mechanism” inherently carries connotations of systems and processes, implying structure, characteristics, and functions, and emphasizing systematization, organization, and integration [7]. Its fundamental meaning encompasses three aspects: first, the connections between constituent elements of a thing, i.e., structure; second, the role it plays in regular movement, i.e., function; third, the process and principles by which it performs its function. Synthesizing these three aspects, “mechanism” can be summarized as a “pattern with inherent regularity. [9]”

Although natural sciences and social sciences differ in their definitions of “mechanism,” several common perspectives can be summarized: mechanisms possess tangible entities; their operation follows inherent patterns; mechanisms constitute organized activities; mechanisms possess structure and hierarchy; their functions often carry purposefulness; mechanisms establish causal links between activities themselves and their outcomes. Based on this, this study defines a mechanism as the interrelationships and operational modes among various policies, systems, safeguards, and oversight measures that support activity implementation to achieve specific objectives.

Regarding the connotation of “teacher supply.” Researchers have proposed a three-tiered theoretical framework for teacher supply in rural compulsory education based on its policy foundations: university-based supply (universities

providing graduates), central and provincial institutional supply (establishing qualified teacher criteria, county-level teacher hiring quotas, and salary standards through institutional frameworks), and county-level factor supply (counties selecting teachers through open recruitment) [10]. From the perspective of their interactive relationship, source supply and institutional supply overlap while representing distinct facets of teacher supply, jointly forming a two-dimensional structure. Factor supply intersects with the first two dimensions, collectively pointing toward the outcome dimension of teacher supply—quality and quantity. The practical demands for both "quality" and 'quantity' in teacher supply, in turn, influence source supply, institutional supply, and factor supply. Thus, these three dimensions collectively form the intrinsic logic of teacher supply. However, from the perspective of supply-side structural reform, alongside rising living standards and the public's earnest desire for "access to quality education," the current education sector indeed faces a supply-demand gap. The relatively backward education supply system struggles to meet the public's demand for high-quality education and high-caliber teachers [11]. Simultaneously, amid the demographic shift of declining school-age populations due to low birth rates, demands for efficient teacher resource allocation have significantly increased between counties within provinces, as well as between urban and rural areas and schools within counties. Considering both supply-side structural reforms and demographic shifts, it warrants re-examination whether the traditional three-tier teacher supply model—where responsibilities are divided among the national, provincial, and county levels—can continue to withstand scrutiny. Additionally, some researchers have proposed an internally driven teacher supply theory emphasizing non-cognitive human capital qualities such as teachers' emotional labor and occupational well-being, addressing critical issues like teacher attrition, abandonment of teaching, retention challenges, rural deployment difficulties, and deficiencies in core competencies and capabilities [12]. This internal supply theory similarly faces challenges in reconciling the demands of supply-side structural reform for teachers in the new era with the shifting dynamics of the school-age population.

Regarding the current management authority of county-level governments over teacher resources, the "Opinion on Promoting the Exchange and Rotation of Principals and Teachers in Compulsory Education Schools within County (District) Jurisdictions" jointly issued by the Ministry of Education, Ministry of Finance, and Ministry of Human Resources and Social Security in September 2014 explicitly states: "The exchange and rotation of principals and teachers shall implement a working mechanism of 'provincial coordination with county-level implementation as the main focus.'" [13] The "county-led" teacher management mechanism grants county governments broader autonomy, enabling them to exercise independent authority over multiple aspects of teacher management—including staffing allocation, recruitment access, position adjustments, professional title management, performance-based compensation distribution, teacher training, and assessment evaluation—while also possessing authority over institutional provision, factor supply, and internal supply mechanisms. Therefore, the aforementioned two teacher supply theories are not applicable to this study. Given that this research is based on specific county-level investigations, and to facilitate its conduct, this study defines "teacher supply" within the scope of county governments' authority over teacher supply. It posits that teacher supply should encompass at least several dimensions: teacher staffing supply, teacher position supply, teacher professional title supply, teacher incentive and security supply, and professional development supply. Furthermore, in line with the essence of "mechanism," the county-level teacher supply mechanism refers to the interrelationships and operational methods among various policies, systems, safeguards, and oversight measures implemented to enhance the quality of teacher workforce development and promote the equitable and high-quality allocation of teaching resources.

2. The Mismatch Between County-Level Teacher Supply Mechanisms and Future Population Changes

2.1 The Temporal Mismatch Between Static Teacher Quota Management and Dynamic Population Fluctuations

From a complex systems theory perspective, a healthy organization or mechanism must possess the flexibility to adapt to environmental changes. For county-level teacher supply mechanisms, the most critical variable is the school-age population. The current teacher supply mechanism in counties fundamentally conflicts with dynamic changes in its underlying management logic and operational paradigm. Designed based on the traditional assumption that school-age population size is relatively stable or undergoes slow linear changes, this mechanism struggles to adapt to future complex and volatile shifts in school-age demographics. Consequently, it responds insensitively to population fluctuations.

From a macro perspective, the existing education management system treats the education system as a closed system that can be planned and controlled. Within this framework, the teacher supply mechanism pursues fine-tuning and stability around a certain "equilibrium point"; staffing quotas seek a "reasonable" teacher-student ratio and strive to maintain it; financial allocations rely on the previous year's base for growth; school layout plans, once determined, remain unchanged for many years; and teacher recruitment also sets routine scales based on historical experience. When external demographic environments undergo severe, nonlinear "wave-like" shocks, the entire mechanism demonstrates severe maladaptation from macro to micro levels.

Examining the teacher supply mechanism itself: First, current staffing, education, and planning departments often base their projections of school-age populations on macro data released by higher authorities or fragmented internal estimates, lacking granular calculations broken down by township, educational stage, and grade level within counties. For instance, discussions about reducing teacher recruitment only began after two consecutive years of declining first-grade enrollment, failing to anticipate the cascading impact on middle-grade staffing three years later when fourth-grade enrollment would sharply decline. Second, the decision-making and adjustment processes for teacher supply currently involve lengthy cycles.

For instance, when enrollment declines, schools must undergo a series of procedures to adjust staffing: reporting to the education bureau, bureau verification, submitting proposals to county-level staffing and finance departments, cross-departmental coordination, approval by the county government, and final implementation. During this process, surplus teachers, idle staffing quotas, and related fiscal expenditures persist. Since population shifts are continuous, by the time adjustments are implemented, they may already lag behind new demographic realities. Finally, the existing teacher supply mechanism exhibits weak resource adaptability, hindering flexible mobility across schools, districts, educational levels, and disciplines. For instance, when attempting to transfer surplus elementary Chinese language teachers to fill junior high vacancies or convert them into mental health educators, constraints such as qualification barriers, inadequate targeted training systems, and job placement obstacles impede rapid restructuring and innovation of teacher resources.

2.2 The Spatial Mismatch Between the Solidified Urban-Rural Binary in Teacher Allocation and the Urban Concentration of School-Age Population

As urbanization deepens, the spatial distribution of school-age populations within counties is undergoing profound restructuring. The prevailing logic and management models for teacher allocation in counties largely perpetuate a rigid urban-rural binary mindset, creating sharp conflicts with the new spatial patterns of population mobility. This leads to severe spatial misallocation of resources and inefficiency.

On one hand, the primary manifestation of this conflict is the failure of teacher allocation to dynamically adjust in tandem with the spatial migration of school-age populations. In urban areas experiencing substantial population inflows, the pace of school construction and teacher recruitment often lags behind the growth rate of the school-age population. While new school construction and expansions have increased enrollment capacity to some extent, the longer training and recruitment cycles for qualified teachers result in urban schools facing persistent pressures of teacher shortages and excessive workloads. The issue of oversized class sizes is thus likely to persist for an extended period. Concurrently, in rural areas experiencing sharp outflows of school-age children, numerous village schools and teaching points face shrinking enrollment. Small-scale schools with only a dozen or even a handful of students per institution may continue to proliferate. If uniform student-teacher ratio standards continue to be applied, these schools will be disadvantaged in teacher staffing allocations. Yet to maintain operations and offer a full curriculum, they are forced to employ multiple teachers, resulting in extremely low student-teacher ratios in rural schools. However, these “excess” teachers are difficult to effectively reassign to urban schools in urgent need of staff due to factors such as their official status, professional backgrounds, and adaptability to new environments.

On the other hand, conflicts arise from the ineffectiveness of mobility policies like “county-managed, school-hired” in breaking down urban-rural barriers. The current teacher supply mechanism at the county level still operates under the inertia of assuming urban-rural student ratios will remain constant, attempting to maintain a static equilibrium through short-term rotations of individual teachers. This results in substantial sunk costs in teacher resource allocation for rural schools, while investments in structural optimization and future-oriented teacher reserves for urban education remain inadequate. This spatial strategy misalignment prevents educational infrastructure and human resource investments from matching long-term population distribution patterns. Consequently, it fails to meet urban residents’ growing demand for quality education while also falling short of revitalizing increasingly depopulated rural education, creating a double bind.

2.3 Structural Mismatch Between Teacher Shortages and Changes in School-Age Population Quality

Against the backdrop of declining birth rates, China’s basic education has transitioned from a stage of “basic balance” to one of “high-quality balance.” Educational expectations from families and society have reached unprecedented heights, with growing demands for educational equity, quality, and personalized development. However, the existing teaching workforce in counties exhibits significant gaps in meeting these new demands—whether in terms of professional title distribution, educational attainment structure, or internal composition—revealing profound structural mismatches in quality.

Regarding professional title distribution, the proportion of teachers holding associate senior titles in most counties is significantly below the regional average. Compared to the national average, especially that of developed eastern regions, the share of associate senior-level teachers in county-level teaching staff is notably lower. Regarding educational background, most counties supply fewer elementary school teachers with bachelor’s degrees than the regional average, and there is an overall shortage of teachers with master’s degrees in both primary and secondary schools. Simultaneously, due to their single-industry economies, most counties lack sufficient support for talent recruitment, and even when talent is attracted, retention remains challenging. This poses significant obstacles to optimizing the educational structure of the county teaching workforce. Moreover, the development of soft infrastructure—such as training systems, teaching research communities, and academic environments — that supports teachers’ continuous professional growth lags behind in most counties. This further limits the capacity of county-level teaching teams to address structural shortages internally.

Discrepancies in subject structure are particularly acute and urgent. The national curriculum explicitly mandates the full implementation of all courses—including moral education, intellectual education, physical education, aesthetic education, and labor education—to promote students’ comprehensive development. However, county-level data reflects broader systemic issues: severe shortages exist in specialized teachers for subjects like music, physical education, art, information technology, mental health, and elementary science. Many schools resort to having core subject teachers cover these roles or simply cannot offer these courses. This directly hinders the implementation of quality education at the county level, undermining students’ development in aesthetic literacy,

physical fitness, labor skills, and psychological well-being. This structural shortage in subject areas is not a new issue, but it will become more severe as student enrollment declines and surplus teachers in core subjects emerge.

2.4 The Misalignment Between Administrative Fragmentation and Complex Demographic Shifts

Currently, the governance system for teacher supply in counties remains in its initial coordination phase. Departments have yet to form a tightly integrated, efficient "governance community," with frequent occurrences of departmental fragmentation and dispersed responsibilities. This lack of coordination conflicts with the systemic, collaborative governance model required to address complex demographic shifts.

This lack of coordination is first evident in poor interdepartmental collaboration. Key aspects of teacher management—recruitment, training, evaluation, mobility, and exit—involve multiple functional departments including staffing, human resources, finance, and education. The staffing department controls overall quotas and standards; human resources manages position establishment, professional title evaluation, and salary policies; finance oversees fund allocation; and education handles the actual deployment and management of teachers. Legally and administratively, these departments are equal, each operating under distinct statutory responsibilities, operational logic, and performance assessment objectives. The staffing department aims to control the size of the public payroll, the human resources department seeks to maintain standardized, unified, and equitable personnel policies, the finance department prioritizes fund security and efficiency, while the education department pursues institutional effectiveness and quality improvement. These objectives are not always aligned and can sometimes directly conflict. For instance, the education department may seek to preemptively recruit teachers in certain subjects based on population projections, only to be blocked by the staffing department due to a lack of available positions. Efforts to increase allowances for rural teachers to boost motivation may require additional budget support from the finance department and breakthroughs in wage policies from the human resources department. A bottleneck in any one of these links can stall the entire plan. The absence of a powerful, permanent coordinating and decision-making body above the departments means that any cross-departmental policy adjustment requires significant time and effort for communication, negotiation, and compromise. The coordination costs are extremely high, often leading to fragmented policy formulation and costly coordination during implementation.

3. Establishing a Teacher Supply Mechanism Aligned with Changes in County-Level School-Age Population

Addressing the multiple contradictions between county-level teacher supply mechanisms—including staffing quotas management, urban-rural allocation, structural shortages, and administrative management—and future shifts in school-age population, the value logic for county-level teacher workforce development should be "high-quality and balanced." Improvements to the county-level teacher supply mechanism should be guided by systems thinking, holistic thinking, and forward-looking thinking.

3.1 Establishing a Data-Intelligent Technology-Driven Dynamic Quota Management and Precision Planning Response System

To address the wave-like fluctuations in school-age populations, it is imperative to fundamentally reform static and rigid quota management models. A modern quota management system driven by big data and artificial intelligence technologies must be established—one capable of forward-looking prediction, dynamic adjustment, and precise response. This represents the fundamental technical pathway to resolving temporal misalignment issues.

First, establish a new dynamic staffing management mechanism featuring "provincial coordination, municipal allocation, and county-level utilization." At the provincial level, an Education Resource Planning Center should be formed, jointly staffed by education, staffing, statistics, and development and reform departments. This center would be responsible for developing a unified provincial dynamic staffing adjustment algorithm model and macro-level guidance policies. The core principle is to delegate and empower municipal-level authorities with substantive coordination and allocation rights. Municipal governments should be granted the authority to conduct annual cross-county and cross-grade-level staffing allocations within the provincially set total quota. This power should be exercised based on real-time school-age population data, migration trends, and educational reform needs across counties (cities, districts). For instance, surplus staffing from County A due to declining elementary school enrollment could be temporarily allocated to areas in County B anticipating a surge in high school-age populations. Basic staffing quotas are determined based on standard class sizes and fundamental educational tasks, while flexible staffing quotas are allocated by municipal authorities according to projected population fluctuation ranges. These flexible quotas are specifically designated to address regional and temporary fluctuations in teacher demand. Additionally, flexible quotas must have defined usage periods and be dedicated to specific purposes, enabling flexible staffing mobility.

Second, develop and deploy a county-level school-age population monitoring and early warning system coupled with an intelligent teacher allocation platform. This platform should integrate data from multiple departments—including public security household registration, health and wellness birth records, human resources and social security, and education enrollment—and utilize models such as cohort analysis and machine learning. It will enable rolling forecasts of school-age populations within counties, broken down by township, school, and grade level, covering the next 3-5 years. These forecasts will be presented through visual maps and dashboards.

Finally, shorten the teacher staffing approval cycle. Reform the three-year staffing approval cycle by implementing a flexible approach featuring routine monitoring, annual micro-adjustments, and biennial re-evaluations. Concurrently,

utilize the platform's annual forecast data as the core basis for staffing refinements. Expand county governments' autonomy in staffing adjustments by increasing the annual quota or percentage allowable for micro-adjustments. Education authorities may propose annual pre-adjustment recommendations to staffing departments—not exceeding a specified percentage—based on forecast trends, enabling proactive teacher reserves or reductions.

3.2 Innovating a New Ecosystem for Urban-Rural Teacher Allocation and Incentive Support

To overcome spatial mismatches in urban-rural teacher allocation, we must transcend simplistic "rotational teaching" approaches. Instead, we will build a new ecosystem centered on "shared development," underpinned by substantive incentives, and facilitated through diverse mobility mechanisms.

The core initiative involves comprehensively advancing and deepening reforms in "school district management" and "school consortium operations" to forge a shared destiny for the teaching workforce. Leading high-quality brand schools must be mandated to form substantive, tightly integrated educational consortia or large school districts with several surrounding underperforming or rural schools. Within these consortia, unified management of teaching staff, coordinated curriculum development, integrated instructional advancement, joint teaching research, unified assessment analysis, centralized resource allocation, and cultural integration must be implemented. A crucial step involves the group management coordinating and dynamically allocating teaching positions and staffing quotas across member schools, transforming teachers' identity from "school-based personnel" to "group-based personnel."

Building on this foundation, robust incentive and security mechanisms are designed to enhance teachers' willingness to relocate. For economic incentives, substantially increase special allowances for teachers serving in rural or underperforming schools, establishing a progressive growth mechanism proportional to continuous service years to provide significant financial rewards for long-term commitment. For career development incentives, implement a combined system of regular and group-specific professional title evaluations. Core criteria for advanced title evaluations should include years of support service at underperforming schools within the group, work performance, and impact on improvement, while relaxing requirements for research projects and publications. For living support, county governments will coordinate the construction of high-standard teacher housing communities in rural or cross-regional teaching hubs, equipped with essential living and recreational facilities. Green channel services will be provided for teachers' spouses' job transfers and children's school enrollment.

Simultaneously, diversify teacher mobility formats. Beyond traditional full-time exchanges lasting 1-3 years, vigorously promote more flexible and targeted forms such as "master teacher outreach programs," "curriculum sharing," and "joint project research." This approach enables more precise delivery of high-quality resources while minimizing disruption to teachers' family lives.

3.3 Implementing a Strategic Approach to Optimize Teacher Workforce Structure and Enhance Professional Quality

To bridge the gap between the current quality and structure of the teaching workforce and the demands of the new era, a supply-side structural reform must be undertaken with both strategic resolve and precise execution. This reform will drive a fundamental transformation of the teaching workforce—shifting from scale expansion to quality-driven development, and from structural imbalance to optimized allocation.

First, conduct precise teacher demand audits and forecasts. Led by county-level education departments, integrate national curriculum frameworks, college entrance exam reforms, local industrial development needs, and student core competency requirements to conduct detailed projections of teacher demand across all educational levels and subjects for the next five years. Clearly define "which subjects require strict control, which need supplementation, and which competencies demand enhancement." Second, implement large-scale transformation of existing teachers in oversupplied disciplines. Collaborate with teacher training institutions and educational research organizations to develop joint certification programs for critical subjects like music, physical education, art, mental health, STEM education, career planning, and family education guidance. Simultaneously, implement targeted policies for chronically underserved subjects—music, physical education, art, science, and information technology—featuring "targeted training, targeted employment, and preferential treatment." In public teacher recruitment, establish dedicated tracks for shortage subjects, appropriately relaxing academic and age requirements while prioritizing assessments of professional skills and practical competencies. Post-employment, provide significant preferential treatment in compensation, professional title advancement, and training opportunities to enhance position attractiveness.

Furthermore, comprehensively upgrade the professional growth support system for teachers. Leverage cutting-edge technologies like big data and artificial intelligence to create an intelligent teacher allocation platform. This platform will generate personalized professional development plans for each educator and intelligently push customized learning resources. Enhance teachers' research capabilities on real teaching challenges through school-based curriculum workshops, lesson case studies, and online master teacher studios. Establish dedicated funds to support promising teachers in conducting innovative educational research, publishing monographs, and visiting prestigious domestic and international institutions, thereby cultivating a cohort of local educational experts.

3.4 Refine Modern Educational Governance and Comprehensive Support Mechanisms for Diverse Co-governance

The successful implementation of the "county-managed, school-hired" reform relies on the modernization of

governance systems. Therefore, it is essential to establish a diverse co-governance framework characterized by clear responsibilities, efficient coordination, transparency, and vitality, providing robust institutional safeguards for teacher supply mechanism reforms.

First, it is recommended to establish a Leading Group for Educational Development Planning and Resource Allocation Reform at the county level, spearheaded by the principal leader of the Party committee or government. This group should include heads of departments such as personnel, education, human resources and social security, finance, and development and reform, establishing a regular deliberation and decision-making mechanism. The group's primary responsibilities include reviewing medium-to-long-term teacher supply plans based on population projections and coordinating solutions to major cross-departmental obstacles during implementation. Concurrently, vigorously advance reforms to streamline administration, delegate power, and improve services, simplifying procedures for handling staffing quotas, positions, salaries, and social security during teacher mobility.

Second, effectively implement and expand the autonomy of primary and secondary schools to stimulate their internal motivation. Within the framework of school consortiums, further delegate authority to schools or consortiums in teacher recruitment interviews, position appointments, and performance-based salary distribution. Permit schools to autonomously establish specialized positions and explore flexible hiring models—such as part-time or project-based teachers—within approved staffing quotas and total positions, based on their unique characteristics and developmental needs.

Third, establish robust, transparent, and inclusive social oversight and evaluation mechanisms. All plans, policies, recruitment announcements, mobility schemes, and professional title evaluation results concerning teacher allocation must be publicly disclosed through government portals, official media, and other channels in accordance with laws and regulations. Establish "County Education Development Advisory Committees" comprising People's Congress deputies, CPPCC members, renowned principals, outstanding teachers, parent representatives, community representatives, and experts to provide consultation and conduct hearings on major education decisions.

Finally, foster a social culture that honors teachers, values education, and tolerates mistakes in reform. Through media campaigns and showcasing exemplary cases, widely publicize the inspiring stories and contributions of outstanding teachers and principals in promoting educational equity and advancing reforms. For unintentional errors arising from pioneering efforts in reform exploration, provided procedures are compliant, actions are public-spirited, and no personal gain is sought, establish a mechanism for tolerating and correcting mistakes to protect the initiative of reformers.

4. Conclusion

Confronted with the intertwined challenges of wave-like fluctuations in the school-age population and deepening urbanization, the teacher supply mechanism in counties is undergoing a paradigm shift from "static adaptation" to "dynamic coordination." This study reveals that the current challenges in county-level education—manifesting as temporal misalignment, spatial imbalance, structural gaps, and fragmented governance across four dimensions (staffing quotas, urban-rural allocation, quality structure, and governance systems)—stem fundamentally from systemic tensions between traditional static management models and complex demographic shifts. Resolving this dilemma hinges on establishing a new mechanism that synchronizes with changes in the school-age population: leveraging digital intelligence to enhance the foresight and responsiveness of staffing management, enabling flexible teacher mobility aligned with demographic shifts; transcending rigid urban-rural dichotomies through shared communities to regenerate the value of high-quality teachers within collaborative ecosystems; and activating the latent potential of existing teaching staff through targeted transformation, shifting the workforce structure from passive filling to proactive evolution. Breaking administrative barriers through multi-stakeholder governance to infuse holistic and collaborative institutional principles into education management. Establishing this collaborative mechanism represents not only a strategic response to shifting school-age demographics but also a profound practice of Chinese-style educational modernization at the county level. It enables the education system to maintain resilience against uncertainty while upholding the foundational value of educational equity within a dynamic equilibrium, ultimately providing a prepared environment for every child's growth.

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