Reforming Education Finance to Address Secondary Mathematics Teacher Shortages in New York State

By: Jean-Pierre Jacob

Introduction

New York State currently has one of the most expensive public education systems in the United States, spending approximately $36,293 per pupil, which is roughly 91 percent above the national average (Citizens Budget Commission, 2024). Based on this exuberant level of spending, it is expected that the state would produce the strongest educational outcomes in the country. And yet, recent data from the state assessments showed that only 57 percent of students in grades three through eight meet proficiency standards in mathematics (New York State Education Department, 2025) Results from the National Assessment of Educational Progress showed that New York State ranked 26th out of 50 US states in Grade 8 math proficiency, with score of 271, 1 point below the national average of 272 (National Center for Education Statistics, 2024). Despite significant financial investment, New York has underperforming students because it struggles to effectively allocate resources to schools.

New York is aware of these gaps in investment, as the state has made substantial progress in advancing fiscal equity through reducing wealth-based disparities and incorporating student-need weights and regionalized cost adjustments. On the surface, these efforts have met many of the traditional criteria for an equitable and adequate school finance system. But the results in secondary mathematics show that increased equity in funding has not produced equity in educational opportunity. This paper argues that New York's school finance system reflects a persistent disparity between intent and impact. The state has designed a funding model that is progressively structured around student need, but it has not implemented mechanisms that align financial resources with the realities of teacher labor markets. Without targeted mechanisms to address teacher recruitment, retention, and distribution in mathematics, increases in overall funding are unlikely to close persistent gaps in student outcomes.

Section I: Historical Context: Finance Reform in New York

For decades in the 1900s, New York State permitted wide variation in per-pupil spending across districts. However, this funding structure changed with the landmark litigation, Campaign for Fiscal Equity (CFE) v. State of New York, initiated in 1993. CFE was created on behalf of students attending New York City public schools, and it argued that the state's funding system systematically deprived students of the opportunity to receive the constitutionally guaranteed basic education. It was not until 2003 that the ruling held that New York City students had been denied that opportunity, and the courts ordered the state to reform its funding system. The court concluded that basic education must include meaningful access to specific educational inputs, including qualified teachers, appropriate class sizes, and adequate instructional materials (Rebell, 2009). Thus, students were entitled to the conditions necessary for learning, but they were not guaranteed any particular level of academic achievement. The state's legislative response to CFE was the creation of Foundation Aid, which was designed to ensure adequate resources for high-need students, particularly in New York City. Foundation Aid incorporated a base per-pupil allocation, adjusted for regional cost differences through a Regional Cost Index, weighted for student need through a Pupil Need Index, and moderated by a measure of local fiscal capacity that determined each district's expected local contribution.

The implementation of Foundation Aid was almost immediately complicated by the Great Recession, as the spending cuts that followed the recession had measurable effects on educational outcomes in districts that were more dependent on state aid (Goldstein & McGee, 2020). New York froze Foundation Aid for several years, and the formula was not fully funded until 2023, more than fifteen years after its original enactment. During the intervening period, high-need districts operated with resources significantly below what the formula specified as

adequate. These cuts had particular consequences for teacher labor markets. When districts face sustained fiscal pressure, they are more likely to defer investments in teacher recruitment and retention, more likely to rely on less experienced or uncertified educators, and less likely to develop the compensation structures that might attract qualified candidates in shortage areas.

More recently, New York has added several additional legislative actions. In 2022, the class size reduction mandate (Chapter 556) required New York City to implement a phased reduction in class sizes across K–12 grades over a five-year period. However, this mandate substantially increased the demand for teachers at precisely the moment when the teacher pipeline is under stress. The state has simultaneously attempted to address teacher shortages through targeted programs such as the NYS Math and Science Teaching Incentive Program, which provides tuition support for prospective secondary math and science teachers, and the Teachers of Tomorrow program, which offers recruitment incentives for hard-to-staff districts and subject areas. However, as these reforms are not explicitly linked to the funding structure in New York or sufficiently tied to teacher retention in high-need schools, I hesitate to claim that these programs will have a drastic impact on student achievement.

Section II: The Structure of New York's Funding Formula

Before advocating for revisions to education finance in New York State, it is important to understand the Foundation Aid formula to assess what it has achieved and where it falls short. The formula begins with a base per-pupil foundation amount, set by the state and intended to represent the cost of providing an adequate education to a typical student in an average-cost district. This amount is then adjusted first by the Regional Cost Index that accounts for variation in the cost of educational inputs across the state's diverse geographic regions. For example, the

cost of living in New York City and its surrounding suburbs is dramatically higher than in rural upstate areas; therefore, New York City and its suburbs receive a higher RCI adjustment. This adjustment is most relevant to teacher compensation, since competitive salaries in rural areas are often inadequate in higher-cost, urban areas. Second, a Pupil Need Index weights the base allocation according to the poverty and English learner populations served by each district, so that students with greater needs require more resources to achieve comparable outcomes. Third, the formula incorporates an expected local contribution, calculated based on each district's property wealth and income, which determines how much the district is expected to generate locally before state aid supplements the difference. By centralizing a significant portion of education funding and redistributing it on the basis of need and local fiscal capacity, Foundation Aid has reduced the relationship between local property wealth and school spending (Lafortune, Rothstein, and Schanzenbach, 2018).

While the formula has strengths, its limitations have caused disconnects in improving actual results. The most critical limitation is that Foundation Aid is a student-centered formula rather than a labor-market-responsive one. This means the formula distributes resources based on students' characteristics and where they live, but it does not directly account for the cost of attracting and retaining teachers. This is compounded by the structure of teacher compensation at the local level. As Podgursky and Springer (2007) explain in their analysis of teacher compensation systems, the dominant model is the step-and-lane system, which determines pay by years of experience and educational credentials. However, in the current state of education, this pay schedule reflects neither the current structure of professional labor markets nor the differential scarcity of teachers across subjects. For example, a secondary mathematics teacher with ten years of experience and a master's degree earns the same salary as a teacher in any other

subject with identical credentials and experience. The issue is that this system fails to recognize that the external opportunity cost of a mathematics teacher is substantially higher than that of a teacher in a non-shortage subject. Chingos and West (2010) explain that teachers with stronger academic skills, which are measured by outside labor-market earnings, are more likely to leave teaching, and that secondary mathematics teachers are disproportionately represented in that group.

Paying competitive salaries is exacerbated by the expansion of charter schools, as per-pupil funding follows students into charter schools while certain fixed costs remain in district budgets. Charter schools also have greater flexibility in compensation and may compete with traditional public schools for the limited pool of qualified mathematics teachers. This further strains districts' ability to recruit and retain secondary mathematics teachers under the constraints of uniform salary schedules. However, as New York already spends the most money per pupil in the country, this is not a problem that more money can solve. Therefore, solutions will require structural change in how compensation is determined and how state funding can be used to support differentiated pay.

Section III: Evaluating Equity and Adequacy

As a state that spends $36,293 per pupil but fails to ensure equitable access to qualified mathematics teachers in its highest-need schools, New York has not achieved equity in any meaningful sense of the term. On standardized assessments, New York's performance is substantially weaker than its per-pupil spending might predict. National Assessment of Educational Progress data from 2024 indicate that only 28 percent of eighth-grade students nationally score at or above the Proficient level in mathematics. Within New York, racial and

socioeconomic disparities in outcomes are substantial, as white students score roughly 35 percent proficient on Grade 8 mathematics, while Black and Hispanic students score approximately 16 and 12 percent proficient, respectively (NCES, 2024).

These gaps are plausibly explained by differences in access to effective teachers. New York's teacher equity rating of 1.8 out of 5 places it among the least equitable states in the nation for qualified teacher distribution. Data reveal that uncertified teachers are nearly seven times more concentrated in higher-minority schools than in lower-minority schools, specifically 8.4% compared to 1.2%. The disparity extends to teacher experience as well, as inexperienced teachers make up 16.3% of the workforce in higher-minority schools, compared to just 7.1% in lower-minority schools. This creates a gap of 9.1 percentage points, which is well above the national average gap of 6.3. A similar pattern holds across income lines, as the gap in inexperienced teachers between higher- and lower-poverty schools is 10.4 percentage points in New York, nearly double the national gap of 5.8. Taken together, the students who most need strong instruction are the least likely to receive it (Learning Policy Institute, 2024).

This pattern of teacher distribution reflects the predictable outcomes of a compensation system that does not account for the differential attractiveness of working conditions across schools. Without financial incentives to accept positions in high-need schools, experienced and certified teachers rationally choose placements where working conditions are more manageable. The result is a systematic inequity in instructional quality that funding parity alone cannot address. This analysis suggests that the appropriate policy response is restructured funding of the mechanisms that create direct financial incentives for qualified mathematics teachers to enter and remain in high-need secondary schools.

Section IV: The Secondary Mathematics Teacher Incentive Fund

The analysis developed in the preceding sections points toward a specific and tractable policy reform: the creation of a Secondary Mathematics Teacher Incentive Fund (SMTIF) within New York's education finance system. The rationale for the SMTIF flows directly from New York's persistent, subject-specific shortage of qualified secondary mathematics teachers, especially in high-need schools. Currently, shortages are driven by labor-market competition from higher-paying STEM careers and by a compensation system that does not differentiate pay by subject or school context. As general funding increases through Foundation Aid, it will not address this shortage because they do not change the incentive structure; a targeted incentive fund can address this failure.

The SMTIF would be funded through a line in the state education budget that supplements Foundation Aid. Eligibility would be determined at the district level based on mathematics teacher vacancy rates, the percentage of mathematics courses taught by uncertified or out-of-field teachers, and student poverty rates. This targeting ensures that resources are concentrated where the shortage is most acute and the need is greatest. The SMTIF would be administered by the New York State Education Department and would provide funding to school districts for three categories of incentives.

First, recruitment bonuses of $15,000 to $20,000 would be available to newly hired certified mathematics teachers who accept positions in schools identified as high-need based on poverty rates and teacher vacancy data. These bonuses would be paid in two installments: 50 percent at the time of hire and 50 percent at the end of the first school year, but this second bonus is contingent on continued employment.

Second, retention bonuses of $10,000 to $15,000 would be available to mathematics teachers who remain in high-need schools through their third and fifth years of employment, respectively. Literature has consistently identified these years as critical junctures for teacher retention, as teachers who survive the first three years are substantially more likely to remain in the profession, and those who reach the five-year mark have typically developed sufficient instructional effectiveness to produce meaningful gains for students. By targeting retention incentives at these moments, the state can maximize its impact on both teacher supply and instructional quality.

Third, to address the acute shortage in high-cost regions, like New York City, the SMTIF would provide cost-of-living supplements to mathematics teachers in districts where the housing cost burden exceeds 30 percent of a beginning teacher's salary. These supplements would be calculated on a sliding scale based on local housing cost indexes.

Evidence Supporting the Reform

The evidence for targeted teacher compensation incentives is based on studies of recruitment and retention responses to financial incentives, on the relationship between teacher quality and student outcomes, and on analyses of differentiated pay structures. Regarding recruitment and retention, the research literature consistently finds that financial incentives can meaningfully affect teacher labor supply decisions, particularly in high-need contexts. Jackson et al. (2016) provided evidence on the relationship between school spending and educational outcomes by demonstrating that increases in per-pupil spending for low-income students produced significant long-term gains in educational attainment and adult earnings.

Hanushek and Rivkin (2010) document that teacher quality is among the most powerful school-based determinants of student achievement, with the difference between a highly

effective and a less effective teacher amounting to a full year of learning gains over an academic year. A student who does not successfully complete Algebra I with a qualified teacher is unlikely to access the upper-level mathematics sequence, which forecloses access to Advanced Placement courses, competitive college programs, and STEM careers. For low-income students in high-need New York schools, these long-term effects represent meaningful improvements in economic mobility. The case for the reform is thus about the long-run returns to students and to the state's economic productivity.

Additionally, Podgursky and Springer (2007) reviewed a wide range of teacher compensation reforms in the United States and found that differentiated pay structures, based on subject, school context, or demonstrated effectiveness, are more effective than a one-size-fits-all approach in addressing subject-specific shortages. The rationale is that a uniform salary increase raises the cost of teaching across all subjects, including those with adequate supply, whereas a targeted incentive concentrates resources where the supply constraint is most acute. As New York faces a teacher shortage in secondary mathematics, this distinction would make state education investments more efficient.

Accountability Mechanisms

A funding change without accountability mechanisms may shift dollars without shifting practices, leaving the underlying problem unaddressed. The SMTIF addresses this issue by incorporating a robust accountability framework that ensures financial incentives drive instructional improvements. Districts receiving SMTIF funds would be required to report annually on three categories of outcomes. The state will require districts to report the number of mathematics teacher vacancies at the start of the school year. Districts will also need to provide the percentage of mathematics courses taught by certified teachers, and the percentage of

mathematics teachers in their first, third, and fifth years of employment. These metrics provide a direct measure of whether the incentives are improving the supply and stability of the mathematics teaching workforce.

To understand the effectiveness in providing more advanced coursework access, the state will need to measure the percentage of students at each grade level enrolled in grade-appropriate mathematics courses, the percentage of ninth-grade students successfully completing Algebra I, and the number of students enrolled in Algebra II, Precalculus, and AP mathematics courses. These measures capture whether improved teacher supply is translating into expanded access to rigorous coursework and whether students are passing the foundational math courses.

Accountability measures will use student performance outcomes such as annual changes in Regents mathematics pass rates, Grade 8 mathematics proficiency on state assessments, and NAEP mathematics trends. These measures provide data for student-level outcomes and will inform whether the SMTIF has improved mathematics achievement for students in high-need schools.

Districts that fail to demonstrate progress on teacher pipeline metrics and student achievement within three years would be required to develop and submit corrective action plans. These plans would be developed in consultation with NYSED and with teacher preparation programs. Districts that demonstrate sustained progress on both pipeline and student outcome metrics would become eligible for additional SMTIF resources in subsequent years, which creates a positive incentive for continued improvement.

Addressing Potential Critiques

The proposed reform will face several predictable critiques, including that differentiated pay by subject creates inequities among teachers and may generate resentment that undermines

school culture. However, if teacher incentives are implemented transparently and are grounded in labor market data rather than administrative decisions, then the complaints should be resolved. New York already acknowledges subject-specific shortages through its Teachers of Tomorrow and Math and Science Teaching Incentive programs, in which New York utilizes targeted financial aid to bolster the educator pipeline. Under the Teachers of Tomorrow initiative, the state provides school districts with grant funding to offer recruitment incentives for areas of greatest need, including secondary mathematics. Additionally, the NYS Math and Science Teaching Incentive Program offers competitive scholarships to undergraduate and graduate students who commit to teaching these specific subjects in a New York secondary school for five years. Therefore, the SMTIF extends this logic to compensation rather than simply to recruitment support, and thus is fair to all teachers. Moreover, Hanushek (2011) argues that the failure to differentiate compensation by quality and scarcity is a source of inequity that affects high-need students, who are systematically denied access to the most effective and qualified teachers.

Another critique regards the fiscal realities of New York State. Currently, New York's education budget is already under pressure from pension obligations, class size reduction mandates, and the costs of full Foundation Aid funding. Due to these constraints, New York spends more money per pupil than any other state in the country. Therefore, the state may lack the fiscal capacity to implement a new incentive fund at a meaningful scale. As stated earlier, the solution to the math teacher shortage is not more money, but targeted support. The SMTIF should initially be rolled out to the districts with the most acute teacher shortages, where the fiscal impact can be most carefully monitored. Using a phased implementation would allow the state to evaluate the program's effectiveness before committing to full-scale deployment. This would prompt lawmakers to make lasting, structural revisions to the State Education budget.

However, SMTIF must acknowledge that financial incentives alone cannot solve a teacher retention problem that is partly rooted in working conditions. If secondary mathematics teachers leave high-need schools because of large class sizes, inadequate instructional materials, unsupportive administration, and high rates of student behavioral challenges, then financial incentives may be insufficient to retain them. To address this critique, districts that attract teachers through the SMTIF but fail to create the conditions for those teachers to be effective will not demonstrate progress on outcome metrics and will be required to make corrective action plans. The SMTIF would create an incentive for districts to invest in supporting conditions and compensation as a coherent strategy to improve secondary mathematics instruction.

Conclusion

The disparity between New York's fiscal investment and its educational outcomes is a structural problem that requires a structural solution. Incremental increases in Foundation Aid will not solve a problem rooted in the misalignment between compensation structures and labor market realities. The proposed Secondary Mathematics Teacher Incentive Fund addresses this gap by creating financial incentives for qualified mathematics teachers to enter and remain in high-need secondary schools. Pairing those incentives with robust accountability mechanisms tied to teacher pipeline metrics, access to advanced coursework, and student performance outcomes, the reform ensures that financial resources translate into improved instruction rather than simply shifting the terms of an existing shortage. The Secondary Mathematics Teacher Incentive Fund offers a targeted, evidence-based, and fiscally responsible path toward ensuring that the state's substantial investment in public education translates into the expanded opportunity that students in its highest-need communities have been promised.

References

Bifulco, R., & Reback, R. (2014). Fiscal impacts of charter schools: Lessons from New York. Journal of Policy Analysis and Management, 33(2), 452–487.

Campaign for Fiscal Equity v. State of New York, 100 N.Y.2d 893 (2003).

Chingos, M. M., & West, M. R. (2010). Do more effective teachers earn more outside the classroom? Education Finance and Policy, 7(1), 8–43.

Citizens Budget Commission. (2024). Highest costs, middling marks: New York's education spending and performance. Citizens Budget Commission.

Goldstein, J., & McGee, J. B. (2020). Did spending cuts during the Great Recession really cause student outcomes to decline? CALDER Working Paper No. 236-0120.

Hanushek, E. A. (2011). The economic value of higher teacher quality. Economics of Education Review, 30(3), 466–479.

Hanushek, E. A., & Rivkin, S. G. (2010). Generalizations about using value-added measures of teacher quality. American Economic Review, 100(2), 267–271.

Jackson, C. K., Johnson, R. C., & Persico, C. (2016). The effects of school spending on educational and economic outcomes: Evidence from school finance reforms. Quarterly Journal of Economics, 131(1), 157–218.

Jackson, C. K., Rockoff, J. E., & Staiger, D. O. (2014). Teacher effects and teacher-related policies. Annual Review of Economics, 6(1), 801–825.

Lafortune, J., Rothstein, J., & Schanzenbach, D. W. (2018). School finance reform and the distribution of student achievement. American Economic Journal: Applied Economics, 10(2), 1–26.

Learning Policy Institute. (2024). The state of the teacher workforce: A state-by-state analysis of the factors influencing teacher shortages, supply, demand, and equity.

National Center for Education Statistics. (2024). The Nation's Report Card: Mathematics 2024 (NCES 2024-202). U.S. Department of Education, Institute of Education Sciences.

New York City Department of Education. (2024). Regents examination results 2023–2024. NYC DOE Office of Assessment.

New York State Education Department. (2023). Foundation Aid overview and 2023–24 formula summary. NYSED Office of Finance.

New York State Education Department. (2025). 2024–25 state assessment results: Grades 3–8 mathematics. NYSED.

Podgursky, M., & Springer, M. (2007). Teacher compensation systems in the United States K–12 public school system. Peabody Journal of Education, 82(4), 651–683.

Rebell, M. A. (2009). Courts and kids: Pursuing educational equity through the state courts. University of Chicago Press.