



# Education Funding and School Achievement

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## Introduction

The Basic Education Funding Commission is tasked with developing a plan to meet the Commonwealth Court order to repair Pennsylvania’s unconstitutional system of funding K-12 education. The Court found that Pennsylvania’s schools are inequitably funded because school districts rely heavily on local sources of revenue and school districts vary widely in their capacity to raise revenues at reasonable levels of taxation. The Court found that, as a result, Pennsylvania does not give all students access to the comprehensive, effective, and contemporary system of public education required by Article II, sections 14 and 32 of the Pennsylvania Constitution.

The Court’s decision was based on the conclusion—which followed a review of the extensive evidence put before it—that levels of school funding matter to the quality of education children receive.

While this conclusion should be the start of the Commission’s deliberations as it works toward producing a plan to meet the Constitution’s requirements, it may help the Commission and others who seek to influence or assess the Commission’s work to review the evidence that supports the Court’s claim that school funding makes a difference to successful schools whether they are measured by student achievement in school or later-life well-being. So this policy brief gives a summary of the relevant evidence found in what is now an enormous body of academic research.<sup>1</sup>

## The Upshot

That body of research now firmly supports the conclusion that school funding matters; and it matters a great deal. In the vast majority of well-designed studies, additional school funding has been shown to lead to students staying in school longer and graduating high school at higher rates; getting better standardized test results; having higher incomes as adults; and even being more likely to marry and stay married. And that is especially true for students who are living in poverty or are Black: additional funding for their schools can partly overcome the barriers created by poverty or racial discrimination.

Moreover, the evidence for this conclusion comes from enacting exactly the kind of public policy that is called for by the decision in the school funding lawsuit and is being considered by the Basic Education Funding Commission: adding new state funds to previously underfunded districts and, in doing so reducing economic, racial, and ethnic inequity in school funding.

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1. The intellectual framework for this piece, and many of the sources, owes a great deal to two blog posts by C. Kirabo Jackson, Rucker C. Johnson, and Claudia Persico, “[Boosting Education Attainment and Adult Earnings](https://www.educationnext.org/boosting-education-attainment-adult-earnings-school-spending/),” *Education Next*, Fall 2015, <https://www.educationnext.org/boosting-education-attainment-adult-earnings-school-spending/>; “[Money Does Matter After All](https://www.educationnext.org/money-matter/),” *Education Next*, July 17, 2015, <https://www.educationnext.org/money-matter/>; and to the overview of the subject by Bruce Baker, *Does Money Matter in Education, second edition*, Albert Shanker Institute, 2016, <https://www.shankerinstitute.org/resource/does-money-matter-education-second-edition>.

The evidence is now so compelling that Eric Hanushek—who for years was one of the leading academic figures questioning the contribution of school funding to student success and who testified for the defendants in the Pennsylvania school funding lawsuit—recently published a paper that recognizes the preponderance of recent evidence now shows that school funding does make an important difference.<sup>2</sup>

Hanushek does continue to insist—rightly, in the view of those who have long believed in the importance of school funding—that how money is spent makes an important difference as well. It has long been clear to everyone in this field that money can be wasted in our schools. As we see below, the research on how best to improve school performance is not definitive. There is some support in the literature for recruiting and training better teachers, reducing class sizes, providing more student supports, and other approaches.

*But one thing is clear: without new funding there is no way to adopt any of them.*

Perhaps the best way to survey the evidence is to look at the history of research on the subject over the last sixty years. That history shows how new research methods and new evidence have initially challenged and then reversed the academic consensus that school funding does not have a dramatic impact on academic achievement and later-life success.

### The Coleman Report and After

Those of us old enough to remember the release of the famous Coleman Report Study in 1966 can recall the shock of reading a large, statistical analysis that called into question the impact of school funding on student achievement as measured by standardized testing.<sup>3</sup> The Coleman Study used data from a cross-section of students in 1965 to examine the relationships between school spending, family background, and test scores. The report summarized its finding by saying “it is known that socioeconomic factors bear a strong relation to academic achievement. When these factors are statistically controlled, however, it appears that differences between schools account for only a small fraction of differences in pupil achievement”<sup>4</sup>

While the Coleman Study was disheartening to many who believed that effective education could overcome economic inequality and poverty to create some degree of equality of opportunity, others said that we should not be surprised that schooling could not make up for the impact of sometimes deep poverty in which too many of our children are raised.

### Further Studies

That skepticism was reinforced by a series of studies that, using a similar methodology, came to roughly the same conclusions. A series of overviews of these studies by Eric A. Hanushek pointed

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2. Danielle V. Handel and Eric A. Hanushek, “[US School Finance: Resources and Outcomes](https://hanushek.stanford.edu/sites/default/files/publications/Handel%20Bhanushek%202023%20NBER%20w30769_1.pdf),” Working Paper 30769, National Bureau of Economic Research, February 2023, [chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://hanushek.stanford.edu/sites/default/files/publications/Handel%20Bhanushek%202023%20NBER%20w30769\\_1.pdf](https://hanushek.stanford.edu/sites/default/files/publications/Handel%20Bhanushek%202023%20NBER%20w30769_1.pdf).

3. James S. Coleman et. al. [Equality of educational opportunity](#). U.S. Department of Health, Education and Welfare, 1966.

4. Ibid. pp. 21-22.

to the same result.<sup>5</sup> Then it was further reinforced by the gross results of the significant increase in school spending between 1970 and the present, which did not lead to large increases in test scores or other measures of academic achievement.<sup>6</sup>

### *Questions About the Coleman–Hanushek Approach*

In recent years, however, both kinds of evidence have been challenged on both substantive and methodological grounds.

Scholars have noticed, first, that the claim that nationwide increases in school spending did not lead to higher academic achievement ignores other changes in our society and schools that might have led to lower academic achievement. As C. Kirabo Jackson, Rucker Johnson, and Claudia Persico point out, “...these spending increases occurred against the backdrop of countervailing influences, such as the rise in single-parent families, more highly concentrated poverty, deterioration of neighborhood conditions for low-income families, the exodus of the middle class to the suburbs, mass incarceration, the crack epidemic, changes in migration patterns, and others.”<sup>7</sup> In addition, during this same period schools across the nation were moving, often under court order or state mandate, to expand services to students with severe disabilities. That led to higher K-12 spending but not to spending designed to improve academic achievement on the part of all students. Drop-out rates of students who did less well in school also declined. All these factors were likely—and in some cases could be shown—to lead to worse education results. So, it’s quite possible that the new school spending in the 1980s and 1990s was important in stopping a decline in school achievement that would have occurred without it. Jackson, Johnson, and Persico give a telling analogy: cigarette smoking among women declined by 30% between 1960 and 2000, yet their rate of lung cancer death did not decline and, on some reports, increased during this period. That evidence is not, however, thought to weaken the claim that cigarette smoking causes lung cancer, which was well supported by other evidence. Rather, researchers concluded that other factors led to an increase in lung cancer deaths.

Second, the results of the Coleman Report and other similar studies have been challenged because they could not easily prise apart the impact of different levels of school funding as opposed to the socioeconomic status of parents on school achievement. The major source of school funding in the United States is property taxes. School districts with high property values, which allows them to raise revenues for schools, are typically those in which residents’ incomes are also higher. Test scores tend to be higher in these districts. But it is impossible to say how much these high test scores can be accounted for by the high socio-economic status of students as opposed to the high spending levels of the schools they attend. The design of the statistical analysis in the Coleman Study and others, did not and could not provide any clear evidence to conclude that socio-economic status was more

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5. These studies are reviewed in a number of pieces by Eric A. Hanushek. The most widely cited is [The Failure of Input-Based Schooling Policies](#), *The Economic Journal*, 113, (February 2003), F64-F98, <chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://hanushek.stanford.edu/sites/default/files/publications/Hanushek%202003%20EJ%20113%28485%29.pdf>.

6. This argument is due to Eric A. Hanushek in “[The Failure of Input-Based Schooling Policies](#).” He summarizes it in the paper “[Money Matters After All?](#),” *Education Next*, Volume 23, No. 4, Fall 2023, <https://www.educationnext.org/money-matters-after-all/>.

7. C. Kirabo Jackson, Rucker C. Johnson, and Claudia Persico, [Money Does Matter After all](#), *Education Next*, July 17, 2015, citing NCES, Digest of Education Statistics, 2012, <https://www.educationnext.org/money-matter/>.

important than well-funded, good schools. But that was the conclusion reached at the time by most who read it.<sup>8</sup>

Third, despite the methodological problems with the earlier arguments pointing to the lack of impact of school spending on academic achievement or later-life success, recent work that re-analyzes the earlier research has found more evidence for the impact of school funding than previously thought. For example, more recent studies show that during the period of increased school funding NAEP scores have increased for Black children and low-income urban children;<sup>9,10</sup> that high school graduation rates went up for Black and Hispanic students;<sup>11</sup> and that the rates of low-income students enrolling in post-secondary education went up as well.<sup>12</sup>

And fourth, a major reassessment of the series of studies Hanushek analyzed, conducted by Larry Hedges, Richard D. Laine, and Bob Greenwald, called into question the conclusion that school funding did contribute to educational success.<sup>13</sup> Hedges et. al. noted that even the simpler method of aggregating different studies on the relationships between school funding and education outcomes used by Hanushek—essentially counting how many surveys show such a relationship and how many do not—casts doubt on his conclusions. They point out that if school funding had no relationship to school success, then in drawing samples for the studies, by chance, half of them would likely show a positive relationship and half would show a negative relationship, and only 5% of the results would be statistically significant. But 70% of the studies in Hanushek’s sample show that per-pupil expenditures are positively correlated with better education outcomes and the percentage of those that are statistically significant were “2.3 to 7 times” that which would be expected due to chance.”

Using more advanced methods of aggregating individual studies, Hedges et. al. found that per-pupil expenditures and many of the things that additional funding allows—more experienced and educated teachers, higher teacher salaries, lower student / teacher ratios—are positively correlated with student achievement at a statistically significant level. Their analysis of the strength of the relationships

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8. Why did they come to this conclusion? That’s an interesting question of intellectual history about which I can only speculate. The main reason, I suspect, is that social scientists trained in the fifties and sixties, like today, were inclined to look to “deeper” structural issues like poverty than to policy issues like education funding as an explanation for outcomes. And then the nature of statistical methods encouraged the conclusion that socio-economic status, not education funding, was the prime source of variation in test scores. When we test the hypothesis that an “independent variable” education funding matters and use socio-economic status as a “control variable,” we wind up showing that your independent variable is not that important. But if the two variables change places, the data would suggest the opposite conclusion.

9. Richard Rothstein, “[Fact-challenged policy](https://www.epi.org/publication/fact-challenged_policy/),” *Economic Policy Institute*, March 8, 2011, [https://www.epi.org/publication/fact-challenged\\_policy/](https://www.epi.org/publication/fact-challenged_policy/).

10. Alan B. Krueger, [Reassessing the view that American Schools are Broken](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1023716#:~:text=Abstract,may%20actually%20be%20reasonably%20effective.), *Economic Policy Review*, 1998, [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1023716#:~:text=Abstract,may%20actually%20be%20reasonably%20effective.](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1023716#:~:text=Abstract,may%20actually%20be%20reasonably%20effective.)

11. C. Kirabo Jackson, Rucker C. Johnson, and Claudia Persico, [Money Does Matter After all](https://www.educationnext.org/money-matter/), *Education Next*, July 17, 2015, citing NCES, Digest of Education Statistics, 2012, <https://www.educationnext.org/money-matter/>.

12. Sandy Baum, Sandy, Jennifer Ma, and Kathleen Payea, “[Education Pays 2013: The Benefits of Higher Education to Individuals and Society](https://research.collegeboard.org/media/pdf/education-pays-2013-full-report.pdf),” The College Board, 2013, [chrome-extension://efaidnbmninnibpcjpcglclefindmkaj/https://research.collegeboard.org/media/pdf/education-pays-2013-full-report.pdf](https://research.collegeboard.org/media/pdf/education-pays-2013-full-report.pdf).

13. Rob Greenwald, Larry V. Hedges, and Richard D. Laine, [The Effect of School Resources on Student Achievement](https://doi.org/10.2307/1170528), *Review of Educational Research*, Vol. 66, No. 3 (Autumn, 1996), pp. 361-396. <https://doi.org/10.2307/1170528>

suggests that “an increase of PPE [per-pupil expenditure] by \$500 (approximately 10% of the national average [at the time of the study]) would be associated with a 0.7 standard deviation increase in student outcome. By the standards of education treatment interventions, this would be considered an exceptionally large effect.”<sup>14</sup>

## A New Direction in Research: The Impact of School-Finance Reforms

### *The Jackson–Johnson–Persico Paper*

Research on the impact of school funding (and other factors) on student success, whether in school or in later life, took a new direction with the work of C. Kirabo Jackson, Rucker C. Johnson, and Claudia Persico (hereafter JJP).<sup>15</sup> Seeking to overcome the methodological flaws of the Coleman Study (and other similar works), JJP recognized it was possible to take advantage of court-mandated school-finance reforms (SFRs) to estimate the impact of increases on school funding on education outcomes. While Coleman-like studies get mired down by the strong relationship between school funding levels and the socio-economic status of parents, additional school funding that comes about because of court order are not connected to previous levels of spending or parents’ socioeconomic success. Thus, the quasi-experiment created by SFRs makes it possible to estimate the effect of additional school funding provided by the state on student achievement and later-life success.

In other words, JJP and those who have done similar studies are, in effect, evaluating the very policy that Pennsylvania advocates of school finance reform have called for: adding state funds to school districts that have historically been underfunded.

Another important feature of JJP’s work is that their initial study measured the success of additional school funding not by looking at test scores but at later-life success. They were able to do this by drawing on an extensive data set that periodically surveyed a nationally representative sample of families and children from 1968 to 2011.

JJP’s results are striking. They find that increasing per-student spending by 10 % in all twelve school-age years

- increases the probability of high school graduation by 7 percentage points for all students, by roughly 10 percentage points for children from poor families, and 2.5 percentage points for children from non-poor families.

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14. The impact of some changes in one variable on another is expressed in terms of standard deviation when using standardized regression coefficients. Standardized coefficients make it possible to compare the impact of different factors that are measured in ways that are not easily comparable, e.g., per-pupil expenditure and teacher experience.

Hedges et. al. find that per-pupil expenditure and teacher experience are positively and strongly related to student outcomes. But teacher salary, teacher education, teacher / pupil ratio, facilities, and other factors show a “mixed pattern of median regression coefficients, sometimes being positive and sometimes being negative.” They conclude, “This pattern of results is consistent with the idea that resources matter but allocation of resources to a specific area (such as reducing class size or improving facilities) may not be helpful in all situations. That is, local circumstances may determine which resource inputs are most effective, and local authorities utilize discretion in wisely allocating global resources to the areas most in need.

15. C. Kirabo Jackson, Rucker C. Johnson, and Claudia Persico, The effects of school spending on education and economic outcomes: Evidence from school finance reforms. *The Quarterly Journal of Economics* vol. 131, no. 1, pp. 157-158. Also available as [National Bureau of Economic Research Working Paper 20847](#).

- boosts adult hourly wages by 13% for children from poor families but has a negligible effect on children from non-poor families.
- increases later-life family income by 17.1% for children from poor families, while not having much impact on children from non-poor families.<sup>16</sup>
- increases the likelihood of being married and never divorced by 10 percentage points among children from low-income families.
- reduces the annual incidence of adult poverty among those who grew up low-income by 6.1 percentage points.

JJP recognize, as do all who study these issues, that just adding school funding does not make schools more effective by itself. As they point out, creating lavish faculty lounges is not likely to improve education. They found, however, that “when a district increases per-pupil school spending by \$100 due to reforms, spending on instruction increases by about \$70, spending on support services increases by roughly \$40 and spending on capital increases by about \$10, while there are reductions in other kinds of school spending, on average. While instructional spending makes up about 60 percent and support services make up about 30 percent of all total school spending, the two categories account for about 70 percent and 40 percent of the marginal increase, respectively.” As a result, a 10% increase in school spending leads to “about 1.4 more school days, a 4% increase in base teacher salaries and a 5.7% decrease in student-teacher ratios.”

### *State Studies*

JJP’s striking paper stimulated additional research focused on the impact of court-ordered school reforms which, by and large, has supported their conclusions.

Joydeep Roy’s study of the impact of Michigan’s Proposal A, which increased state funding to the lowest spending schools, found that not only did the adoption of the plan equalize school spending but it also brought about significant gains in student achievement.<sup>17</sup> For every \$1,000 increase in spending per student, Roy finds that the percentage of students scoring at or above the satisfactory level in reading went up between 3 and 6 points for reading and 6 and 8 points for mathematics. Leslie Papke and Joshua Hyman reported similar results in two other studies of the Michigan initiative.<sup>18</sup>

John Deke’s study of school funding reform in Kansas also found that school funding changes designed to equalize per-student expenditure had a significant impact on students. His research

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16. As JJP point out, higher family income can be a product of individuals having higher incomes, being more likely to be married, or marrying individuals who also have higher incomes (perhaps because they benefited from the same court-ordered education spending).

17. Joydeep Roy, “[Impact of School Finance Reform on Resource Equalization and Academic Performance: Evidence from Michigan](https://direct.mit.edu/edfp/article/6/2/137/10136/Impact-of-School-Finance-Reform-on-Resource),” *Education Finance and Policy*, (2011) Vol. 6 No. 2, 137-167, <https://direct.mit.edu/edfp/article/6/2/137/10136/Impact-of-School-Finance-Reform-on-Resource>.

18. Leslie Papke, “The effects of spending on test pass rates: Evidence from Michigan,” *Journal of Public Economics*, 89 (5-6): 821-839, <https://www.sciencedirect.com/science/article/abs/pii/S0047272704000908>. Joshua Hyman, “Does Money Matter in the Long Run? Effects of School Spending on Educational Attainment,” *American Economic Journal*, (2017) Vol. 9 No. 4, 256-80, <https://www.aeaweb.org/articles?id=10.1257/pol.20150249>.

suggests that a 20% increase in general fund spending on education increased the probability that students would go on to college by approximately 5%.<sup>19</sup>

Three studies of the Massachusetts Education Reform Act of 1993 (MERA), which aimed to distribute more education dollars to schools that had been underfunded, reached similar conclusions. Jonathan Guryan concluded that a \$1,000 increase in per-student spending is associated with an increase in math, reading, science and social studies test scores by about half a standard deviation. (No impact was found for eighth-grade scores although Guryan suspects that the fourth-graders spent “a larger fraction of their education in well-funded schools.”)

Thomas Downes, Jeffrey Zabel, and Dana Ansel show in “Incomplete Grade: Massachusetts Education Reform at 15,” that after considering other factors that might affect them, post-MERA test scores in lower-spending districts were relatively higher compared to higher-spending districts than they were before the new funding. They write, “. . . by 2006, these (low-spending) districts exhibited increases in performance relative to that of the middle- and high-spending districts of 0.7 to 1.4 standard deviations. These are all very large impacts in an economic sense.”

A more recent study by Phuong Nguyem-Hoang and John Yinger reaches the same conclusion: “the substantial increase in Chapter 70 [MERA] aid over the years and changes in its distribution have paid off. If state education aid had remained unchanged since 1993, the mean student performance of all district deciles would have been substantially worse (at least 4.6 percentage points less) than the case of actual Chapter 70 aid in 2006.”<sup>20</sup>

Vermont is another state where school finance reforms had a positive effect on student achievement. Thomas Downes shows that Act 60, which was passed in response to a state supreme court decision, led to a convergence in per-student funding among the school districts of Vermont. And the link was weakened property wealth and both education spending and student performance in school districts.<sup>21</sup> Downes also finds some evidence that student performance has become more equitable since the enactment of Act 60.

### *A New Meta-Analysis*

There are many other studies of state specific or multi-state school reforms that aim to increase and equalize school funding. However, the most impressive evidence we have that additional state

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19. John Deke, “A study of the impact of public school spending on postsecondary educational attainment using statewide school district refinancing in Kansas,” *Economics of Education Review*, (2003) Vol. 22, 275-284, <https://www.sciencedirect.com/science/article/abs/pii/S0272775702000250>.

20. Phuong Nguyem-Hoang and John Yinger, “[Education finance reform, local behavior and student performance in Massachusetts](#),” *Journal of Education Finance* (2014) Vol. 39 no. 4, [https://login.ezproxy2.library.drexel.edu/login?qurl=https://go.gale.com%2f%2f%2fdo%3f%3dAONE%26u%3ddrexel\\_main%26id%3dGALE%257CA367966216%26v%3d2.1%26it%3dr%26aty%3dip](https://login.ezproxy2.library.drexel.edu/login?qurl=https://go.gale.com%2f%2f%2fdo%3f%3dAONE%26u%3ddrexel_main%26id%3dGALE%257CA367966216%26v%3d2.1%26it%3dr%26aty%3dip).

21. Thomas Downes, “[School Finance Reform and School Quality: Lessons from Vermont](#)” in John Yinger, ed. *Helping Children Left Behind: State Aid and the Pursuit of Educational Equity* (Cambridge, MA: MIT Press, 2004), [https://login.ezproxy2.library.drexel.edu/login?qurl=https://web.s.ebscohost.com%2fehost%2febookviewer%2febook%2fZTAwMHhuYV9fMTIyNTYzX19BTg2%3fsid%3d73d14e33-4c47-4c9d-b7d9-f0716fafdd06%40redis%26vid%3d0%26format%3dEB%26lpid%3dlp\\_283%26rid%3d0](https://login.ezproxy2.library.drexel.edu/login?qurl=https://web.s.ebscohost.com%2fehost%2febookviewer%2febook%2fZTAwMHhuYV9fMTIyNTYzX19BTg2%3fsid%3d73d14e33-4c47-4c9d-b7d9-f0716fafdd06%40redis%26vid%3d0%26format%3dEB%26lpid%3dlp_283%26rid%3d0). An earlier version can be found [here](#).

funding has a strong and positive impact on student achievement and later-life success comes from a new attempt to aggregate a wide range of studies—including the state studies I’ve mentioned here—in a meta-analysis conducted by C. Kirabo Jackson and Claire L. Mackevicius that uses the most advanced statistical techniques.<sup>22</sup>

This major research project aggregate data from 34 different studies. Its conclusions provide striking evidence that by providing new funding to schools, states can make a huge difference in student outcomes regarding test scores, graduation rates, and college attendance. More specifically, the reports finds that a \$1,000 per-student increase in spending sustained over four years

- increases test scores by .03 standard deviations.
- increases the high school graduation rate by 2 percentage points.
- increases the rate of going to college by 2.8 percentage points.

The study also makes three other findings that are important for Pennsylvania.

- There is no difference in the impact of new funding based on geography. New school funding has roughly the same impact in urban and rural communities.
- The impact of a \$1,000 per-student spending increase is greater for low-income students than for non-low-income students. The increase in the rate of high school graduation and college attendance due to new funding is three times greater for low-income students than for those with higher incomes. Applying the policy to the average district would lead to an increase in college attendance above 2 percentage points 90% of the time but only 30% of the time for higher-income students. It would increase the rate of college going by 5 percentage points in one-fifth of all cases for low-income students but “almost never” for higher-income students.
- There is little evidence of diminishing returns when new funding is added to schools that are already highly funded. One reason for this may be that high-spending states are also states with higher labor costs. Because education is such a labor-intensive field, high-wage states need to spend more to keep well-trained, experienced, and effective teachers.

### *How We Spend Money Is Important*

While the evidence that new funding contributes to education achievement and later-life success is compelling, it is important to note that this evidence does not show that just any education spending is beneficial. How schools spend money is always important.

It would take us too far afield to survey the evidence about what kind of school spending contributes to effective schooling and then to education achievement and later-life success. But I want to mention

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22. C. Kirabo Jackson and Claire L. Mackevicius, “[What Impacts Can We Expect from School Spending Policy? Evidence from Evaluations in the U.S.](https://www.aeaweb.org/articles?id=10.1257/app.20220279),” *American Economic Journal: Applied Economics* (forthcoming), <https://www.aeaweb.org/articles?id=10.1257/app.20220279>. Quotes are from a draft from January 11, 2023.



three broad conclusions from the literature on the impact of new funding streams from state school reform programs.<sup>23</sup>

First, new funding is generally not frittered away. The evidence we have is that new school funding is not going to frills but rather to core educational expenses. As noted above, the seminal JIPA paper pointed out that new funding goes to core educational expenses at higher rates than school funding in general.

Second, the kinds of spending that seem to result in better educational outcomes are exactly what one would intuitively think they are. Education is labor intensive. All the important work of education is done by teachers in the classroom and in their one-on-one interaction with students. It is thus best done by well-trained, experienced, and effective teachers. So, the most effective way to improve education is to recruit and retain better teachers. In a market economy like our own, the only real way to do that is by paying teachers more. There is substantial evidence that teacher pay has not kept pace with pay in other fields,<sup>24</sup> and this is especially true with regard to teachers who have been in the profession longer.<sup>25</sup> There is also evidence that teachers in districts with higher salaries are less likely to leave the field<sup>26</sup> as well as some evidence that structuring pay scales to better reward teachers with three or more years of experience is a more effective way of raising teacher effectiveness than raising starting salaries.<sup>27</sup>

There have been experiments that tie teacher pay or bonuses to measurable student outcomes. But, to date, the evidence has not shown these policies to be as or more effective than general pay policies that lead to recruiting and retaining qualified and effective teachers.<sup>28</sup> But it is too soon to conclude that such experiments have failed or that additional experiments are unwarranted.

There is also evidence that points to reducing class size, especially in earlier grades, as a way to improve education quality, although the evidence is mixed. One analysis of data from the Tennessee STAR program suggests that small classes lead to greater student success. Students who attend smaller classes go to college at a rate 2.7 percentage points higher in general for students in large

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23. For a more detailed analysis of this question, which has shaped the next two few paragraphs, see Bruce Baker, *Does Money Matter in Education, second edition*, Albert Shanker Institute, 2016, <https://www.shankerinstitute.org/resource/does-money-matter-education-second-edition>.

24. Sylvia Allegretto, Sean P. Corcoran, and Larry Mishel, *The Teaching Penalty: Teacher Pay Losing Ground*, Economic Policy Institute, 2008, [chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://files.epi.org/page/-/old/books/teaching\\_penalty/teaching-penalty-full-text.pdf](chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://files.epi.org/page/-/old/books/teaching_penalty/teaching-penalty-full-text.pdf).

25. Richard J. Murnane and Randall J. Olsen, “[The Effects of Salaries and Opportunity Costs on Length of Stay in Teaching Evidence from Michigan](#),” *The Review of Economics and Statistics*, (1989) Vol. 71, no. 2., 347-352, <https://www.jstor.org/stable/1926983>.

26. Jan Ondrich, Emily Pas, and John Yinger, “[The Determinants of Teacher Attrition in Upstate New York](#),” *Public Finance Review*, Vol 36. No. 1 (2008), <https://journals.sagepub.com/doi/10.1177/1091142106294716>.

27. Matthew D. Hendricks, *Public Schools are Hemorrhaging Talented Teachers: Can Higher Salaries Function as a Tourniquet?*, March 24, 2015, [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2564703](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2564703).

28. Aaron J. Sojourner, Elton Mykerezi, and Kristine L. West, “[Teacher Pay Reform and Productivity Panel Data Evidence from Adoptions of Q-Com in Minnesota](#),” *Journal of Human Resources*, Vol 49. No. 4 (2014), 945-981, <https://www.jstor.org/stable/24735638>.

classes. The benefit twice that much for Black students and is 7.3 percentage points for students enrolled in “the poorest third of schools.”<sup>29</sup>

There is also substantial evidence that pre-K programs have a dramatic impact on school and later-life success. Studies have shown that children who attend pre-K programs score higher on academic tests and that these benefits are greater for those whose families have lower incomes.<sup>30</sup> The effects of pre-K education have also been shown to be long lasting: long term studies have shown that those who receive pre-K education have higher IQs at age five, have higher high school graduation rates, are more likely to own a home, and have higher incomes at age 40.<sup>31</sup>

Third, one reason that research examining the effect of different kinds of changes in school inputs—teacher pay and various ways to deliver it, class size, pre-K and the like—is not yet definitive may be that these different kinds of improvements work very effectively in some circumstances, and with some students, but not as well in others. Much more research needs to be done before it will be possible to give every school district or school definitive guidance about how best to spend their money. So, at present, the best approach may be to increase school funding and allow local school district board members and superintendents, with the advice of their faculty members, to make these decisions while tracking the results of those decisions and holding them accountable for success and failure.

## Conclusion

We may not know exactly what kinds of investments make for better educational outcomes. But we do know that additional state funding directed at historically underfunded districts can make a big difference. It can lift test scores. It can raise high school graduation rates. It can raise the proportion of students who go on to college or to other post-secondary training. It can lead to reduced poverty and higher incomes for adults. And it can even affect the likelihood that adults marry and stay married.

And all these results are more likely for students who come from low-income or poverty-stricken backgrounds and for students of color.

Pennsylvania is a late-comer to court-ordered school finance reform—although we did experience an upsurge in school funding under the Rendell administration that was cut short by the Great Recession of 2008. As a late-comer, Pennsylvania can benefit from the experiences of other states. ***And that experience show us that additional school funding is a powerful tool for improving education, especially in historically underfunded schools.*** While adequate and equitable school funding can't entirely make up for the impact of economic inequality and racial barriers, it can help Pennsylvania

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29. Susan Dynarski, Joshua M. Hyman, and Diane Whitmore Schanzenbach, *Experimental Evidence on the Effect of Childhood Investments on Postsecondary Attainment and Degree Completion*, National Bureau of Economic Research, October 2011, revised July 2013, <https://www.nber.org/papers/w17533>.

30. G. Henry, B. Ponder, D. Rickman, A. Mashburn, L. Henderson, and C. Gordon, “An Evaluation of the Implementation of Georgia’s Pre-K Program: Report of the Findings from the Georgia Early Childhood Study,” Atlanta: Georgia State University, Applied Research Center, 2004, <https://search.issuelab.org/resource/an-evaluation-of-the-implementation-of-georgia-s-pre-k-program-report-of-the-findings-from-the-georgia-early-childhood-study-2002-03.html>; and William Gormley, Jr., Deborah Phillips, and Ted Gayer, “Preschool Programs Can Boost School Readiness,” *Science* 320, June 27, 2008, 1723-24, <https://www.science.org/doi/10.1126/science.1156019>.

31. L. J. Schweinhart et al., *Lifetime Effects: The High/Scope Perry Preschool Study Through Age 40*, Monographs of the High/Scope Educational Research Foundation, Ypsilanti, MI: High/Scope Press. © 2005 by High/Scope® Educational Research Foundation, <https://researchconnections.org/childcare/resources/7622>.

realize the long-delayed promise of creating true equality of opportunity in our state— that is, making it possible for every young person in our state to take advantage of their talents and abilities to create a better life for themselves and, in doing so, contribute to the economic well-being of all of us.