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A Heartland Policy Study
No. 68 — September 26, 1995

Making Schools Work:
Spending and Student Achievement

By Eric A. Hanushek

Executive Summary

A review of the history of education spending and student achievement in the United States between 1890 and 1990 reveals the following trends and lessons:

Real spending on public education in the U.S. is rising rapidly.

- During the past century, total spending on public education, adjusted for inflation, has increased nearly one hundred-fold. Real per-pupil spending increased 25-fold during that period. These increases have been driven primarily by falling student-teacher ratios and rising teacher pay.

- Between 1970 and 1990, the decrease in the student population offset much of the increase in instructional costs. Total spending rose much less than did per-pupil spending. But rising school populations since 1990 will add to total spending.

- The growth in special education programs has played a relatively minor role in both the growth in spending and the decline in student-teacher ratios. At most, the 1980s'...
increase in the special education population cost $3 billion, compared to a total spending increase of $54 billion between 1980 and 1988.

Student-teacher and student-staff ratios are falling.

✗ Falling student-teacher ratios have not led to improved performance or greater efficiency. Expenditures that are aimed at reducing student-teacher ratios directly lower the rate of return on education spending.

✗ Student-staff ratios have fallen more dramatically than student-teacher ratios. In 1950, there was 1 staff person (teacher, administrator, counselor, etc.) for every 19.3 students. By 1990, that ratio had fallen to 1 staff person for every 9.1 students.

✗ Schools compete with other industries for skilled workers. But other industries have experienced more significant productivity gains than have schools, allowing these industries to bid more for the workers they want. To attract teachers of the same quality year after year, schools must raise their salary offers, which adds to school spending.

Student achievement is either flat or falling.

✗ By most measures, student performance has not improved during the past three decades. At best, it has remained flat. At worst, it has fallen dramatically, as SAT scores indicate.

✗ The average minority student consistently performs less well than the typical white student, although this performance gap has narrowed slightly since the mid-1970s.

✗ Students from the U.S. consistently perform less well than those from many other countries. There is little evidence to suggest that this performance gap is narrowing.

Three problems largely explain the inefficiency of public education today.

✓ Disregard for efficiency and productivity. Inefficiency drains off funds, frustrating efforts to achieve superior performance for all students. Yet many educators and administrators act as if education is “too important” for efficiency considerations to matter. In fact, however, education is too important for inefficiency to be tolerated.
Absence of performance incentives. America's public schools offer a case study in the failure of command-and-control regulation. Management by incentives is more appropriate to the complex and highly decentralized nature of effective teaching, yet schools today make little use of performance incentives.

Public schools don't learn from experience. Schools not only lack good answers to the problems that beset them, but they are not generating answers that will help in the future. There is no systematic approach to learning from existing or proposed programs. In the private sector, productive and profitable enterprises are always learning. They are constantly modifying their approach and trying to better their performance.

Policy implications: Focus on greater efficiency, not higher spending.

Instead of searching for new sources of funds, policymakers should ask why schools are not more productive with the funds they currently have. Small gains in efficiency and productivity might well negate the need for additional funding.

Principles that would lead to greater efficiency include: making efficiency and productivity a priority among educators and administrators; creating incentives for greater productivity, perhaps by linking teachers' and administrators' pay directly to the results they achieve with their students, or by letting parents and students decide which schools best meet their needs; and by structuring experiments so that genuine lessons can be learned from their evaluation.

Conclusion

Because the incentives in schools bear little relationship to student performance, it is not surprising that schools have not yet improved student performance, despite constant reform pressures. Several programs are available that would connect incentives to performance — either by linking teachers' and administrators' pay directly to some objective measure of the results they achieve with their students, or by letting parents and students themselves decide which schools best meet their needs and therefore most deserve their support.
PART 1

The History of Overall Cost Growth

Many popular accounts of schools suggest that they have changed little over the past few decades — except perhaps that students have gotten worse. This popular conception, however, misses truly extraordinary changes, not only in the organization and governance of schools, but also in the resources devoted to them. Even a cursory examination of the historical patterns of student performance and school finance highlights a central mystery of the education debate. The nation is spending more and more to achieve results that are no better, and perhaps worse.

The standard nostrum of education reformers — that additional resources should be devoted to each student’s education — belies the fact that per-pupil spending has increased steadily throughout the century. If a case is to be made for increasing education spending, analysis must first begin to understand why past increases in spending are not now producing increased quality.

Many of the calls for education reform emphasize the need for renewed commitment to schooling, which often translates into an appeal for expanded resources for schools. Accompanying this appeal is an apparent belief that real education spending (that is, the amount spent after accounting for inflation) has been constant or has even fallen. Others acknowledge increases but point to the growth in special education or spending on administration to explain why increasing expenditures might coincide with declining quality. But data prove these assertions wrong. Such errors are potentially dangerous, because without a good understanding of how today’s education dollar is spent, it is difficult to see how to devise schemes for more effective spending tomorrow.

By some measures spending on education has grown faster than spending on health. Yet while health care costs are the subject of vigorous debate, the unremitting growth in education spending receives only passing attention in most policy discussions. More ironic, when attention does focus on education spending, it is usually to suggest that spending should rise. But education spending has risen strongly and steadily in real terms throughout the century. Some of the increase is a simple consequence of the increased numbers of school-aged children, but a larger part reflects active policy choices to increase the amount spent on behalf of each student by hiring more and higher paid teachers to teach smaller classes.
Real public spending on elementary and secondary education in the United States rose from $2 billion in 1890 to almost $190 billion in 1990. (All dollar amounts are adjusted by the gross national product (GNP) deflator to constant 1990 dollars; education expenditures exclude capital costs.) This almost hundredfold increase was more than triple the GNP growth rate during the same period. Education spending increased from less than 1 percent of GNP in 1890 to more than 3.5 percent of GNP in 1990.

Spending on public schooling as a percentage of GNP actually peaked in 1975, at almost 4 percent, when baby boomers reached their maximum school-going years. But demographics are only the lesser part of the story of rising education spending. Rising per-pupil spending explains the bulk of the change in education outlays. Figure 1 plots increases in per-pupil spending from 1890 to 1990. Real student spending rose from $164 in 1890 to $772 in 1940 and to $4,622 in 1990, roughly quintupling in each fifty-year period.

Figure 1
Real Current Expenditure Per Student
By Instructional Staff and Other Expenditures, 1890–1990
Figure 1 also separates spending on instructional staff — mainly salaries for teachers and principals — from other school spending. Today, spending on instructional staff accounts for roughly 45 percent of total school spending. In 1940, by contrast, it accounted for about two-thirds. (Even though instructional staff spending excludes items directly related to classroom activities, such as teacher retirement costs, books, and materials, this division does approximately track the locus of spending between the classroom and elsewhere.)

**Instructional Staff Expenditures**

Spending on instructional staff is perhaps the key component of school costs. It determines how many and what kind of teachers are available for classroom instruction.

Three factors drive spending on instructional staff (which we frequently refer to simply as teachers, although a roughly constant 10 percent of the total is spent on other instructional personnel such as principals). First is the absolute size of the school population, which is determined by the numbers of children of the relevant ages, by whether they are enrolled in school, and by whether these schools are public or private. The second factor is variation in the intensity of instruction — including varying average class sizes and the length of the school year. The third force is wage rates and other personnel costs, primarily for teachers. Table 1 illustrates how these three separate forces have affected the growth in instructional staff spending over the past century.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Factor Contributions to Growth in Spending on Instructional Staff, 1890-1990</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor changes</td>
<td></td>
</tr>
<tr>
<td>School population</td>
<td>34</td>
</tr>
<tr>
<td>Instructional intensity</td>
<td>23</td>
</tr>
<tr>
<td>Teacher cost</td>
<td>43</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>


a. Combined effect of changes in the size of the school-age population, the school enrollment rate, and the rate of public school attendance.

b. Combined effect of changes in the pupil-teacher ratio and the number of school days a year.

c. Effect of changes in the price of teachers.
Instructional Staff Spending: 1890-1940. In the early period (1890 1940), a rapidly increasing school-aged population and a rising public school enrollment rate accounted for roughly one-third of the $11.5 billion increase in real instructional staff expenditures. The school-aged population grew by 13.6 million, the enrollment rate rose from 68.4 percent to 80.7 percent, and the percentage of students attending public schools increased by three percentage points to slightly more than 90 percent. Slightly more than 25 million children were enrolled in the public school system by 1940, double the number in 1890.

Even during this period of rapid growth, however, increases in the amount spent on each student accounted for two-thirds of the rise in instructional staff expenditures. Most of this increase in per-pupil spending came from a rise in the price of teachers, which increased by a factor of 2.5 and which, by itself, explained more than two-fifths of the growth in total spending. Changes in the length of the school year and in pupil-teacher ratio accounted for almost a quarter of the spending increase. The average school year lengthened by forty days, and the pupil-teacher ratio declined by roughly 20 percent, from thirty-five students per teacher in 1890 to twenty-eight students per teacher in 1940.

Instructional Staff Spending: 1940-1970. Between 1940 and 1970 increases in the public school population continued to push total instructional staff spending up. Public school enrollment again almost doubled, accounting for 38 percent of the increase in real spending. Most of this increase followed directly from growth in the school-age population, but the overall school enrollment rate rose by five percentage points during this period, to 85.8 percent, while the proportion of students attending public schools fell by two percentage points, to just below 89 percent. By 1970, 46 million children were enrolled in public elementary and secondary schools.

As in the period before 1940, increasing intensity of instruction accounted for something over a fifth of the spending increase between 1940 and 1970. But, because the length of the school year had stabilized by 1940, almost all of this increase was the result of a declining pupil-teacher ratio. That ratio fell to twenty students per teacher during this thirty-year period, a drop exceeding both in absolute numbers and percentage terms the decrease of the previous fifty years. The rising price of instructional staff again accounted for about two-fifths of the spending increase. Teacher wages nearly doubled in real terms over the period, increasing from $83 a day in 1940 to $155 a day in 1970.

Instructional Staff Spending: 1970-1990. Changes in costs between 1970 and 1990 differed dramatically from the two earlier periods. Because of falling birth rates, public school enrollment fell to 41 million students in 1990, roughly 5 million students less than in 1970. Yet continuing rapid growth in per-student spending increased aggregate real spending on instructional staff by 30 percent. The largest factor in spending growth was the further decline in the pupil-teacher ratio, which fell to under sixteen students per teacher in 1990. Increases in teachers' salaries also accounted for a substantial portion of the increase in per-pupil spending. Between 1970 and 1990, teacher price increases were almost 50 percent greater than the total cost savings from the reduced quantity of school children. But
the increases were far from uniform. Between 1970 and 1980 the average price of teachers declined by more than $10 a day, as teachers' earnings failed to keep up with the high inflation rates. Then between 1980 and 1990 teachers' real wages jumped by more than $40 a day.

One contributing factor in the decline in the average pupil-teacher ratio might be an increase in the number of difficult-to-educate children, such as handicapped children or children from low-income families. But the general nationwide decline in the pupil-teacher ratio, which occurred across schools in communities with a wide variety of student populations, suggests that this is not the fundamental reason for change. Direct analysis, discussed below, confirms this conclusion.

Two additional observations compound the puzzle of public perceptions concerning school spending. First, according to substantial evidence, variations in student-teacher ratios do not strongly affect student performance. Second, variations in pupil-teacher ratios do not seem to represent a policy response to changes in the costs of teachers. Whether prevailing wages go up or down for college-educated workers, the student-teacher ratio continues to decline. For these reasons, declining student-teacher ratios would seem to be a pure cost increase that does not lead to improved performance or greater efficiency. Thus expenditures on reducing student-teacher ratios directly lower the return on any education investment.

Historical analysis of spending changes may help to explain why public perceptions of school spending diverge so significantly from the facts. During the last two decades, the drop in the school-age population masked many spending changes. Between 1970 and 1990 the decrease in the student population offset a substantial portion of the increase in instructional costs. So total spending (and the tax rates required to cover spending) rose much less than did real spending per student. Figure 2 shows the annual growth rates for total spending and for per-pupil spending from 1890 through 1990.

Interestingly, except for a period of high growth during the 1960s, average growth in real spending per pupil has been relatively constant at 3 to 3.5 percent a year. But the pattern for total spending, which is affected directly by changes in the student population, has been much more erratic, ranging from slightly more than 2 percent to more than 7 percent a year.
Although total spending grew noticeably slower than did per-pupil spending between 1970 and 1990, the situation is changing. During the 1980s the fall in student population first slowed, then reversed. Data on school enrollments since 1990 confirm that rising school populations will add to aggregate spending instead of subtracting from it. The result could well be rising popular concern about education spending — and a much more difficult fiscal situation for schools — as the myth of constrained spending by schools is exposed.

The Rising Price of Teachers

Changes in teachers' salaries affect more than the cost of education. Any increase or decrease in teachers' wages compared with wages in other sectors alters the relative attractiveness of teaching and, thus, affects the quality of people who enter the profession. Although the average daily wage of instructional staff increased from $34 in 1890 to $83 in 1940 and to more than $183 in 1990 (all expressed in real 1990 dollars), teachers' earnings have generally declined relative to other similarly skilled workers.
The pressure of increased costs of teachers on overall school spending is to be expected. Schools must compete with other industries for highly skilled workers. But other industries have experienced much more pronounced productivity gains than have schools, allowing these industries to bid more for the workers they want. To attract teachers of the same quality year after year, schools must raise their salary offers, which adds to school spending. Alternatively, schools could refuse to keep up with the wages offered elsewhere and let the quality of people they recruit slip.

Figure 3 compares the average earnings of teachers to those of other college graduates who did not enter teaching. Specifically, it charts the percentage of other college graduates earning less than the average teacher. The data are also standardized to allow for differences in the age distribution of teachers and nonteachers. A low percentage means that teaching is relatively less attractive. The general picture is one of declining attractiveness for teaching. The increases in teachers' wages did not keep up with the increases in salaries for college-educated workers in other sectors. Had the overall earnings of teachers kept pace with other careers between 1970 and 1990, the price of teachers would have risen by an additional four percentage points.
Moreover, changes in the relative attractiveness of teaching have differed considerably between men and women. For men the decline in the attractiveness of teaching was most dramatic in the 1940s, with a steady but less sharp fall continuing through 1970. In 1940 the average male teacher earned above the median for college graduates employed elsewhere. By 1960 only one-third of those outside teaching were earning less than the average teacher. The relative attractiveness, however, reversed again in the 1970s and 1980s as male teachers by 1990 regained the same relative position they held in 1960.

By contrast, average earnings for women in teaching remained close to the median earnings in outside employment until 1960, when relative earnings for female teachers began to erode steadily, followed by a sharp decline in the 1980s. Because of rapidly expanding opportunities for women elsewhere in the workforce, the decline in the relative attractiveness of teaching did not reverse itself in the 1980s, as it had for men. Although more than 40 percent of female college graduates were teachers in 1970, only 19 percent were in 1990. More starkly, only 11 percent of female college graduates ages twenty to twenty-nine were teaching in 1990, compared with 41 percent of the same age group two decades earlier.

Although the best teachers may not be the people who can earn the most in other jobs, direct analysis of the data on relative earnings indicates that most college graduates at the top of the ability distribution are entering fields other than teaching and that outside earnings opportunities strongly influence the choice to enter and remain in teaching. The perennial shortages of teachers in mathematics and the sciences result largely from the greater earnings opportunities that technically trained people can find outside of schools.

It is the recent decline in the relative earnings of women teachers that holds the greatest potential problems. For better or worse, the financial attractiveness of teaching for men has changed little or even improved for the past two or three decades. For women, however, changes are more recent and continuing. Because women account for roughly two-thirds of elementary and secondary teachers, the decline in relative earnings potential may well cause significant future problems in attracting and retaining skilled teachers.

The Cost of Special Education

One frequently cited explanation for increases in education spending is the growth in numbers of mentally and physically handicapped students, coupled with legal requirements for providing education services for them. But, despite significant growth in special education, new programs for the handicapped appear in fact to have played a relatively minor role in both the growth in spending and the decline in pupil-teacher ratios.
Concerns about the education of children with physical and mental disabilities were translated into federal law with the enactment of the Education for All Handicapped Children Act in 1975. This act prescribed a series of diagnostics, counseling activities, and services to be provided to handicapped students. To implement this and subsequent laws and regulations, school systems expanded staff and programs, in many cases developing entirely new administrative structures. The general thrust of the education services has been to provide regular classroom instruction — "mainstreaming" — where possible, along with specialized evaluation and instruction to deal with the specific needs of the handicapped.

The availability of extra funding for those students deemed handicapped creates incentives for school systems to expand the population of special education students. The availability of intensive teaching and specialized programs creates similar incentives for parents. Although public school enrollment declined by more than 3 million students between 1977 and 1990, the number of public school students classified as disabled increased by 25 percent, from 3.7 million to 4.6 million, raising the percentage of students classified as disabled from 8.5 percent to 11.4 percent of total public school enrollment. The number of special education teachers increased even faster than the number of children classified as disabled, rising by more than 50 percent between 1978 and 1990.

Simple calculations demonstrate that special education could account for less than one-third of the recent fall in the pupil-teacher ratio. The ratio fell from 17.4 pupils per teacher in 1980 to 15.4 in 1990, a decline of more than 11 percent. But even if both the proportion of students classified as disabled and the pupil-teacher ratio in special education programs had remained constant, the aggregate pupil-teacher ratio would still have fallen to 16.0.

Research also suggests that the growth in special education explains only a small portion of the overall increase in education spending between 1980 and 1988. Although the costs of educating each child vary greatly, the average per-pupil cost of special education has been estimated to be roughly twice the cost of educating a child who does not require any special education. If that is true, than the expansion in the special education population of the 1980s would have cost, at most, $3 billion, which is quite small in comparison with the aggregate spending increase of more than $54 billion during this period. Taken together, these analyses indicate quite clearly that growth in special education could account for only a small part of the growth in per-pupil spending in the 1980s.

Policies for the special education population emphasize providing extra services for the identified population in need, a population that previously was not assured of any distinctive services. There is no reason to believe that the proportion of students requiring such aid has changed over time, only that they now are more accurately singled out for
particular services. Thus, the legislated services should, by lessening the burden of the handicapped on the classroom teacher, make regular classroom spending relatively more effective over time. In other words, increased spending for special education should also yield benefits for regular classroom instruction.

Other Expenditures

Despite vigorous growth, increased spending on instructional staff has been outpaced by growth in other sorts of education spending. Such growth in other spending is often attributed to administrative bureaucracy. For example, former Secretary of Education William J. Bennett wrote, “Too much money has been diverted from the classroom; a smaller share of the school dollar is now being spent on student classroom instruction than at any time in recent history. It should be a basic goal of the education reform movement to reverse this trend toward administrative bloat and to reduce the scale of the bureaucratic ‘blob’ draining our school resources.” Unfortunately the real picture is more complicated. “Other” spending, that is, spending other than that for instructional staff, has indeed been growing fast. But this statistical category includes teachers’ pensions, health insurance, books, and classroom support staff that would arguably be more sensibly included under the heading of total instructional expenditures.

Overall, other spending grew from $0.4 billion in 1890 to $6.4 billion in 1940, and to $101 billion in 1990. Since 1960, this other spending per student rose at an annual average of 5 percent, compared with only 3 percent a year for instructional staff spending. The relative growth of other spending was most rapid during the 1970s, a period when the total school-age population dropped significantly. Few administrators (and few teachers and other school personnel) appear to have been let go when the student population dropped, Had all spending grown at the same rate per student as instructional staff spending between 1960 and 1990 — a period in which the pupil-teacher ratio fell by a third — per-pupil spending in 1990 would have been less than $3,500. Instead the actual figure was more than $4,600 (in real 1990 dollars). In other words, had other factors simply increased in intensity at the same rate as instructional staff spending for the past three decades, total spending would be one-quarter less.

Sparse and inconsistent data make a full understanding of the growth in these other spending categories difficult. Table 2 uses available data to show the distribution of current education spending.

The relative growth of “other” spending was most rapid during the 1970s, when the total school-age population dropped significantly. Few administrators (and few teachers and other school personnel) appear to have been let go when the student population dropped.
Table 2
Percentage Distribution of Current Expenditures, 1960-1990

<table>
<thead>
<tr>
<th>Year</th>
<th>Instructional staff</th>
<th>Other instruction</th>
<th>Central administration</th>
<th>Maintenance</th>
<th>Fixed charges</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>61</td>
<td>7</td>
<td>4</td>
<td>12</td>
<td>7</td>
<td>9</td>
<td>100</td>
</tr>
<tr>
<td>1970</td>
<td>57</td>
<td>11</td>
<td>5</td>
<td>10</td>
<td>10</td>
<td>7</td>
<td>100</td>
</tr>
<tr>
<td>1980</td>
<td>46</td>
<td>15</td>
<td>5</td>
<td>11</td>
<td>14</td>
<td>9</td>
<td>100</td>
</tr>
<tr>
<td>1990</td>
<td>46</td>
<td>12 a</td>
<td>42^2</td>
<td>a</td>
<td>a</td>
<td>a</td>
<td>100</td>
</tr>
</tbody>
</table>


a. Costs for central administration, plant maintenance, fixed charges, and other spending are not separately available for 1990.

Until 1980, at least, the two fastest-growing expenditures in the other spending category were fixed charges and an expenditure called “other instruction,” which includes books and school support staff. The bulk of fixed charges are payments for staff retirement and health insurance. So a substantial portion of the other spending category would actually seem to belong with the direct spending for instructional staff. The only category separately listed for administration is spending on central administration, which includes all administration that is outside of the individual school buildings, such as superintendents, central testing staff, curriculum development staff, and financial services personnel, but not principals. Central administrative costs have remained roughly 5 percent of total spending since World War II. Frustratingly, data available for 1990 are not comparable in detail with those for 1980. Although spending on “other instruction” declined as a share of total spending between 1980 and 1990, it is impossible to determine what happened to the other main categories of spending previously identified.

In pure staff terms, ratios of total staff to pupils have fallen even more rapidly than teacher-pupil ratios. There was a single staff person - teacher, administrator, clerical, counselor, or whatever - for every 19.3 students in 1950. By 1990 that ratio had dropped to 1 staff person for every 9.1 students.

Conclusions About Costs

Even if the student population had remained constant, real aggregate school spending would have increased twenty-five-fold over the past century. Three factors played crucial roles: the rising price of instructional personnel, the declining pupil-teacher ratio, and rising noninstructional staff costs. Although rising costs are often blamed on factors outside of the schools’ control, such as mandated special education services, or on nondclassroom
activities, such as increased central bureaucracy, there is little evidence that these are the primary forces driving up spending. Each plays a part but is dwarfed by other pressures for expanded spending.

The general lack of concern among reformers about the magnitude of growth of school spending is startling. Most reform proposals simply make no mention of spending, implicitly arguing that “getting the right programs” is all that matters. One explanation for the inattention to costs is that a widespread belief in the need for educational improvement has coincided with a pattern of decreased student enrollment, which in turn has allowed per-pupil spending to rise faster than total spending (and, presumably, than tax revenues and tax rates). But student populations are already rising again. This in turn may signal new problems for schools if taxpayers react by turning down requests for new funds.

Today most discussions of education costs focus on the funding (or, more commonly, lack of funding) for specific new programs. The preceding analysis, however, demonstrates that schools have not been starved of funds. Perhaps reformers should really be asking not where new money for schools is to come from, but whether schools spend existing funds wisely.

The fact that education spending has increased does not necessarily mean that it should not increase further. When the amounts various nations spend on schooling as a proportion of the gross domestic product (GDP) are compared, the United States ranks far from the top of the list, and some argue that this relative parsimony may help to explain the lagging performance of American students. We believe, however, that significant changes in spending patterns will be required if student performance is to be enhanced by any additional funding. This argument flows naturally from findings that past spending increases have not been translated effectively into improved student performance.