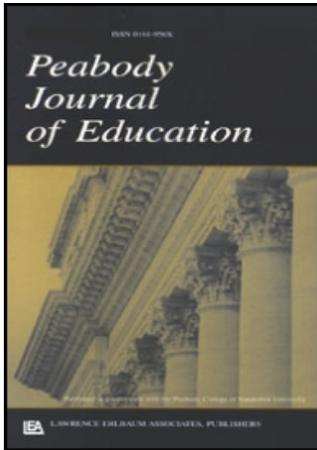


On: 26 June 2008
Access Details: Free Access
Publisher: Routledge
Informa Ltd Registered in England and Wales Registered Number: 1072954
Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



Peabody Journal of Education

Publication details, including instructions for authors and subscription information:

<http://www.informaworld.com/smpp/title~content=t775653692>

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Online Publication Date: 01 April 2008

To cite this Article: Hill, Paul T. (2008) 'Spending Money When It Is Not Clear What Works', Peabody Journal of Education, 83:2, 238 — 258

To link to this article: DOI: 10.1080/01619560801997044

URL: <http://dx.doi.org/10.1080/01619560801997044>

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Spending Money When It Is Not Clear What Works

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Public school funding in the United States is not a product of intelligent design. Funding programs have grown willy-nilly based on political entrepreneurship, interest group pressure, and intergovernmental competition. Consequently, now that Americans feel the need to educate all children to high standards, no one knows for sure how money is used or how it might be used more effectively. This article shows that Americans can learn how to make more effective use of the money available for public schools. But to do so, states and localities must keep careful track of how money is spent; how children are taught and by whom; and what programs, schools, and teachers are most and less productive. Foundations should sponsor rigorous development and testing of new instructional programs, and every level of government should permit experimentation with alternative uses of funds, reproduce effective schools and programs, and abandon ineffective ones.

School district and teacher union leaders claim that public schools can and will educate all children effectively, but only if they get more money. Grassroots educators believe it too, as do parent groups (e.g., the PTA and the League of Women Voters) and large numbers of voters.

The claim is best understood as a political statement, made in pursuit of interest groups' constant objective of getting more money for their clients. But is there anything to it? The claim is valid only if, first, schools now use their money so efficiently that no further improvement is possible with current funding and, second, all schools would become more effective if they got more money.

Our current school financing system is an accident of history. Localities first paid for their schools completely. Then states started to pick up part, or all, of the bill for basic instruction. States further complicated funding by creating separate

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accounts for instruction, materials, construction and maintenance, transportation, and so on. Then the federal government created specially funded programs for specific groups of children—children in poverty area schools, disabled children, limited English speakers, and other categories. The states followed suit with their own targeted programs called categorical. Then the federal and state government funded special functions like teacher professional development and evaluation.

The result is that there are many funding sources, each with its own narrow goals. The overall amount available for spending on public education in any locality is the sum of many different funding programs. The total can be computed, but nobody controls it or asks whether it is enough or too much. The amounts we spend and the ways we spend them do not derive from analysis of what is needed and what it should cost. Instead, school spending is a result of many small disjointed decisions made by different levels of government, legislative committees, courts, licensing boards, citizens in bond elections, and school boards in collective bargaining agreements.

No legislative body or school board is responsible for deciding how much is needed to produce a given set of outcomes—say, to ensure that every nondisabled child will graduate from high school or every high school graduate can enter a 4-year college without taking remedial courses. Public education has many funders, and each acts on its own rules of thumb. None is directly responsible for the results or able to calibrate spending in light of evidence about need or performance.

Thus state legislatures and school boards decide how much to spend based on estimates of voters' tolerance for taxes. Sponsors of state and federal categorical programs also get as much as they can in legislative negotiations. Nobody has any idea about how much is enough to educate all children effectively, and the fragmentation of programs means no one is responsible for the overall effectiveness of public investment.

Each funding source has its own goals and rules about how and on whom money can be spent. A familiar number, the districtwide average per-pupil expenditure, can be calculated, but no one controls it. Roza, Miller, Swartz, and DeBurgomaster (2005) wrote of one middle-sized district that kept 200,000 separate accounts for all the grants and subgrants it received. The district's superintendent and chief financial officer didn't know where the district's money was; moreover, their estimates of relative spending on elementary versus middle and high schools were wrong.

Within school districts, most spending decisions are made by separate central office units that are responsible for certain functions (e.g., teacher hiring, purchasing materials, testing, teacher training), not for overall school performance. Money then arrives at the school level not as fundable cash but as people, equipment, and programs that emerge from the disjointed central process. School leaders must use resources for purposes designated by funding sources and the central office. With respect to the most vital resource (teachers), school leaders often have no say

in whom they employ; collective bargaining rules about assignments, minutes of student contact, and class sizes virtually eliminate flexibility in work assignment. School leaders have few opportunities to cash in people or other resources and use the money for something else; they must make do with what they have. Making do is especially challenging in schools serving the lowest income children. Many teachers are assigned there after being rejected or passed over by other schools.

In this situation it is extremely hard to judge whether money is used as effectively as it could be. It is extremely difficult for anyone to know how money is used, much less whether different uses of resources are associated with different student learning outcomes. Moreover, the rules forbid many logically possible uses of funds (e.g., to trade off some teacher salaries for technology investments or to employ a few excellent high-paid teachers rather than many low-paid ones). Thus, it is impossible to observe natural variations in practice to distinguish more from less productive uses of funds.

These generalizations apply to all public schools, including the relatively high performing ones. We have no idea whether they are using money as efficiently as they can to produce student learning or whether more funding would lead to higher performance. The fact that spending is subject to so many disjointed requirements means that educators have little incentive to bend the rules and take chances, as it is far more risky for a school or educator to diverge from rules about use of funds than it is to fail academically. Some educators do experiment, but they must keep it hidden; thus good ideas seldom move beyond their source.

Uncertainty about links between spending and outcomes and inability to experiment is especially intolerable in schools that don't now teach children what they need in order to function as adults. These are generally schools serving low-income minority children—particularly African Americans, Spanish speakers, and Native Americans—especially in big cities. We know that schools serving the disadvantaged generally do not produce the outcomes their students need, but we have no reason to believe that they make efficient use of the money spent on them. We also have no reason to think they could use more money except to pay more for the people and equipment they now have.

In this situation there is a great deal of uncertainty about how to serve the disadvantaged well, yet the financing system makes experimentation and imitation of success difficult, and the incentive system makes the search for better methods unnecessary.

How would we turn this around toward a financing system that encouraged experimentation, imitation of success, and abandonment of failure? That is my question. I sketch a financing system premised on uncertainty about what works and built to sustain a continuing search for more effective methods. I show that more funding is neither a sufficient nor a necessary precondition to school improvement. I can't show that additional funding could never help—it might well lead to improvement in some cases—but I show that a great deal of money is

wasted now and that additional funding is likely to be wasted as long as our public education system is structured to spend more for the same people and instructional methods, not to identify or build on more effective instructional methods.

This article's main argument is that the greatest barrier to knowing how to spend money is our lack of a mechanism for developing, testing, and improving methods of instruction. If Americans would acknowledge that they don't know how to educate some groups of children so that they all have the knowledge to function in a modern economy—particularly low-income African Americans and Hispanic immigrants—we would be forced to develop and test alternatives, and continuously replace less effective with more effective schools and programs. Over time, this would certainly result in improvement and greater clarity about trade-offs between spending and results. In the end I suggest how we might both make performance-increasing innovation possible and restructure our public education system so it is capable of continuous improvement.

The article has three parts: first, evidence that we don't know how to provide effective schools for all students; second, evidence that money is not the main barrier to improvement; and third, suggestions about how we can produce the needed knowledge and predispose public education to use it.

WE DON'T KNOW HOW TO PROVIDE EFFECTIVE SCHOOLS FOR ALL

U.S. public schools are not as good as they could be for anyone, but they are preparing the majority of White, Asian, and minority middle-class students for higher education, though some slip through the cracks. The school performance problem is severe for low-income minority students (especially African Americans in big cities and Hispanic immigrants) who generally do not learn what they need to learn.

The basic facts about school outcomes for low-income and minority students are well known. They are more likely to abandon school before high school graduation (Greene & Winters, 2005), more likely to be denied high school diplomas because they cannot pass state proficiency tests, and more likely to need remediation should they enter college (Jenks & Phillips, 1998). On the national Assessment of Educational Progress, African American high school seniors get about the same reading and mathematics scores as White and Asian eighth graders (Jenks & Phillips, 1998). In general, average tested academic performance of African Americans is consistently a standard deviation below that of Whites and Asians of the same age (Jenks & Phillips, 1998). That means that the average score of an African American student is at about the 34th percentile for White students.

Celio's analysis of the test score gaps in Washington State reveals something even more alarming: As many as one third of African American and Native

American students score below the 10th percentile for all students (see Huggins & Celio, 2004). Students below the 10th percentile include some who have no measurable proficiency.

There are not many minority students above the 85th percentile, but there are far too many to allow anyone to think that race or ethnicity causes low performance. There is no more reason to believe that minority students' test scores are caused by deficits in their nervous systems than there was to believe the speculation current among testing experts during World War I that immigrant Jews were less intelligent than other Americans.

Moreover, it is clear that minority students' test scores rise when they attend schools that teach serious academic content. In the 1970s Coleman showed that Catholic schools attenuate the correlation between race and test scores (see Coleman, Hoffer, & Kilgore, 1982). Several reports in the 1990s found individual schools with unusually high test scores (Thernstrom, & Thernstrom, 2003).

Arguments about racial and cultural determinism will not go away, but they fail the test of parsimony. Americans have not really tried to make schools more effective for urban minority students. Although there are some noble experiments, the vast majority of schools serving these students are frozen in place by rules and get the worst of everything school districts have to offer—they are more tightly regulated, have more rookie teachers, are much more subject to teacher turnover than other schools in the same districts, and are therefore less demanding and less coherent.

These noble experiments—parochial schools serving the poor and schools like KIPP and Cristo Rey—stand outside the public school system and are financed very differently. However, they are extremely hard to reproduce. KIPP and Cristo Rey depend on special combinations of handpicked leaders, teachers working at wages far below their earning potential, and external supporters (in KIPP's case major foundations and in Cristo Rey's case the Jesuit alumni network that finds students part-time jobs).

Inspiring as these programs are, it is hard to claim they represent a general solution to the problem of educating disadvantaged children. Besides being hard to reproduce, they appear to work for only a subset of the disadvantaged student population. KIPP and the parochial students might not handpick students for admission, but they suffer high rates of attrition among African American students. Cristo Rey is built for Hispanic students whose mild manners make them acceptable employees in businesses and law firms owned by Jesuit school alumni.

These programs are also very expensive, counting the value of philanthropic support and donated time. It is not clear whether these programs raise the money needed to expand indefinitely or find ever larger numbers of educators able to work long hours at low pay. There are, moreover, serious questions about whether these schools fully overcome the educational disadvantages their students came with. Parochial high school students are better bets for college admission than students

graduating from public high schools, so colleges seeking minority students recruit them. But the students' SAT scores are still far below White students' scores (Hill, 1994), and their subsequent college experiences can be difficult. These schools are opening up opportunities, but they are not completely closing the achievement gap.

In this I mean to say nothing against these schools. They are great achievements, and they should be reproduced whenever possible. They are a lifeline for families desperate for something better than their neighborhood public schools. But they neither solve all the problems of the children they serve nor can be expanded to serve all the children who need options. Despite the excellent qualities of these schools, the problem of providing effective schools for the disadvantaged remains unsolved.

In school reform circles it is common to hear the statement, "We know how to provide effective schools for all children, but we lack the political will to do it." This statement is usually well meant as an antidote to despair based on racial determinism. But it is not true. Many well-meaning efforts by able people (e.g., New American Schools designs like Atlas Communities schools led by Ted Sizer, John Comer, and Howard Gardner) accomplished very little. Many promising school models (e.g., San Diego's High Tech High) have worked far better when operated by their inventors than when reproduced under someone else's guidance. Even the parochial schools, often bare bones designs using traditional teaching methods, have been extremely hard to reproduce in the charter school sector.

What we do know about common characteristics of effective schools for the disadvantaged is abstract and evanescent. They have a moral core, coherent curricula and demanding academic standards, strong social cohesion, teachers with intellectual lives, bonds of trust between school and parents, staff members who agree on goals and methods, adults who take responsibility for showing students links among subjects and between school and the adult world, teachers who collaborate to figure out what struggling students need, and so on.

Effective schools have these attributes and ineffective ones do not, but it is not clear how one would build such a school from scratch or how an existing school that lacks these attributes can get them. They can't be learned efficiently out of a book or in a few training sessions. The chemistry that goes into a great school is no easier to reproduce than the subtle bonds that make a great basketball team. It is one thing to say that John Stockton and Karl Malone used the pick and roll, but quite another to reproduce their success.

Thus, we are nowhere close to knowing what it will take to educate all children, including the most disadvantaged, to the point that they are fully prepared for work, higher education, and citizenship. Moreover, even if we knew all the answers for today we would not be sure about what will be needed a generation hence. The economy will change in ways we can't now predict, and so will the requirements for young people to succeed in it.

Worse, we are not in a good position to learn what can work or adapt to new needs. Existing public schools are stuck in place by regulations and contracts, and charter schools generally draw from the public school labor pool for teachers and principals. Charters face little pressure to experiment or innovate because they can prosper simply by offering a more personalized and stable environment (e.g., smaller classes, K-8 or even K-12 in the same school). Private schools similarly compete on the basis of doing the same thing better. None address the fundamental question of how to educate children whom traditional schools, even good ones, don't teach effectively.

LACK OF MONEY IS NOT THE MAIN BARRIER TO PERFORMANCE

The introduction gives many of the reasons money is not the key factor. We don't know how it is used now, and there is nothing about the structure of public education that puts a premium on efficient use of funds.

Until recently it was impossible to say exactly how public schools used money. Given the lack of any design or intentionality, money had to be used inefficiently, but we could not say exactly how. Roza's recent work cracks open district and school spending patterns in ways that both reveal many gross inefficiencies and show that schools not constrained by modes of public funding spend money differently than do district-run schools. Roza has disregarded district budget documents, which use salary averaging and often charge schools for their pro rata share of centrally delivered services regardless of the amounts of those services schools use. She found the actual staff members assigned to schools, counted real salaries and benefits, and allocated central office service costs according to the amounts delivered to particular schools. Within schools, Roza counted actual staffing costs per course and per pupil.

One of her most striking new findings is that district-run schools spend much less (in some cases less than half as much) per pupil on "core" classes like basic English and mathematics than they do on electives like art and AP courses. This is in part because of larger class sizes in core subjects and the fact that higher paid senior teachers can avoid work-intensive core courses. District leaders have been pressing for greater emphasis on core subjects, in part because their reputations depend on tested student performance on reading and mathematics. But because costs and money flows within schools are invisible, they did not know that actual spending is unrelated to announced priorities.

Roza's has a number of other recent key findings:

Schools whose uses of funds are not regulated in ways public schools are (e.g. charters, magnets, and private schools) spend their money differently: more on

instruction, more on teacher salaries, but for larger numbers of teachers at lower average salaries. They also employ fewer classroom aides and hire specialists (e.g. for art and music) only part time. (Roza, Davis, & Guin, 2007)

School budgets look very different when central office services are considered. Schools with inexperienced staff members and principals (often the schools serving disadvantaged children) get measurably less from the central office and therefore have less money spent on them than other schools. (Roza & McCormick, 2006)

Most districts discourage or close small schools, which are often proposed as better environments for disadvantaged students, on the basis of perceived higher cost. However, when cost of central office services received is factored in, the smallest schools in a district seldom cost more per pupil, and often cost less, than larger schools. (Roza, 2007a)

School districts' uses of money are seldom connected to their announced school improvement strategies. (Roza, 2007a)

Many teacher union contract provisions control the use of a great deal of money. Such provisions as salary increases unrelated to performance, days set aside for professional development, personal and sick days, class size limitations, teachers' aides and more generous health and retirement benefits than those enjoyed by other professionals, cost many districts nearly 1/5 of their budgets. None of these uses of funds has a detectable link to student learning. Some of the extraordinarily costly time off, health, and retirement benefits could, if turned into salary increases for the highest performing teachers and promising newcomers, lead to significant school improvements. (Roza, 2007b)

These findings do not say for sure how money should be used, but they do suggest that money could be used much more effectively.

Other analyses of the links between spending and student outcomes accept current uses of money and try to estimate how much more would be needed to increase school performance. Some estimates of needed increases are based on the opinions of educators, none of whom have succeeded in teaching disadvantaged children all they need to know. Others are based on studies that have shown detectable increases in achievement in districts that adopted particular programs. They assume that the same programs adopted in other districts will have the same effect as in the districts studied—contrary to the experience of all previous efforts to export instructional programs. In many cases the districts that originated effective programs made other changes in policy and resource allocation. These, however, are not specified in simple prescriptions like “reduce class sizes,” “use instructional coaches,” or “increase spending on teacher professional development.”¹

¹As an example of such broad prescriptions, see Odden, Goetz, and Picus (2007).

Estimates based on expert opinion vary wildly and have little predictive value, as Loeb (2007) showed. Hanushek (2007) recently demonstrated that the effectiveness claims made for particular programs are wildly exaggerated.

Murnane and Levy (1996) provided an excellent example of a simple prescription—reducing class sizes—that does not work unless many other changes not specified in the prescription also happen. In a Texas district that reduced class sizes in 15 schools, positive changes in student achievement were evident in only 2. The 10 schools made no change in teaching methods, other than to give teachers fewer students. The 2 more successful schools transformed teaching, taking advantage of smaller class size to increase direct student–teacher contact and increase feedback on written work. Class size reduction enabled these changes in instruction but did not cause them (Murnane & Levy, 1996).

To this point this analysis has attacked any claims that we know how to educate disadvantaged children effectively. Now I turn to the question of how Americans can put themselves in a position to track the cost and effectiveness of instructional programs, both to improve what is available to all students and to make informed judgments about links between spending and effectiveness.

HOW TO ADMIT UNCERTAINTY AND GET HIGHER PERFORMANCE

We don't know what works now because we constrain instructional practice within a narrow band of possibilities governed by laws, regulations, and contracts. It is also clear that a great deal of money is spent on things other than instruction. Taken together these facts mean that we can't know how effective schools could be with the money now available. Surely spending greater amounts of money on the same things would waste even more, but we can't say whether, efficiently used, currently available amounts are a little excessive, about right, or not nearly enough.

To know better what works and to make informed trade-offs between expenditures and outcomes we need a very different system, one designed around the expectation that the best methods are unknown but determined to develop, test, and adopt them.

The uncertainty perspective is appropriate because the current structure of public education does not allow enough variation in practice to allow many new ideas to be tried out and does not search for, or capitalize on, innovations. Even if we knew what worked today, and what it cost, we could not be sure what programs or how much money will be needed in the future: We know neither what skills children of the next generation will need nor what forms of instruction technology will make possible.

How can we move toward a system in which we know better how to spend money because innovation is possible, good ideas spread, and less effective practices are replaced with more effective ones?

We can't get the answer through political decision making. As Moe (2003) has shown, politics favors organized interests (e.g., the unions) over disorganized ones (e.g., innovators with ideas that need to be developed and tested) and leads to policies that are hard to change because regulations and bureaucracies are built up to protect them. The politics of education spending answers the question, "How big an appropriation can the supporters of teachers, or vocational education, or computer literacy, swing for [name the interest group] this year?" It does not answer the question, "How much is needed for a student's education?" Group politics leads to a frozen system, not a continuously improving one.

How can we move toward a situation that encourages new ideas about instruction; constantly encourages development and testing; creates avenues for people with new ideas to put them into practice; creates strong incentives for educators and school leaders to search for more effective methods than they now have; and allows children, teachers, and money to shift from less to more productive options?

Determining how much spending on public education is enough is impossible in the absence of a public education system in which funds from all sources can be used flexibly, ineffective activities must be abandoned, and resources can flow to more effective uses. It almost certainly takes more public funding to educate some children than others. However, it also takes less money to run a highly efficient system, where virtually all funds are applied directly to instruction and student services, than an inefficient one, where spending is driven by political and bureaucratic considerations.

What are the necessary elements of a system based on uncertainty and an unending search for better methods? I think there are seven:

- Total transparency about where and on whom funds are spent, what those funds buy, and the true cost of purchases, including salaries.
- Constant tracking of school results (i.e., student outcomes), both prompt (e.g., test results) and long term (e.g., performance at the next level of schooling).
- Thorough student-level analysis of links among funds spent, programs experienced, teacher characteristics, and student outcomes.
- Analysis to identify less and more productive activities, schools, and people.
- Use of analysis results in decisions to abandon or alter unproductive objects of expenditure, or to imitate or reproduce highly effective ones.
- A way of transferring funds and people from less to more effective activities, e.g. an open labor market for teachers and family choice of schools.
- A mechanism for developing and proving new ideas about how to provide more effective instruction, both in general and to particular groups.

Taken together, these attributes would create a demand for demonstrably better schools and methods of instruction, a supply of proven new ideas, and freedom for people and money to move. It will identify effective instructional programs and therefore provide a basis for determining what education should cost.

Our public education system has none of these attributes. Spending and accounting are based on broad categories (e.g., salaries, benefits, capital, transportation), and these are not tracked to the school or student level. Costs are imputed to schools, so that some schools are charged for central services they do not receive and salary cost averaging hides major expenditure differences among schools. Tracking of results is inconsistent and often relies entirely on tests that are at best decent predictors of long-term outcomes. States are only starting to keep student-based records, and only Florida links teacher, student, and school records.

Although states and localities can identify their schools with the highest scores, none has the analytical capacity to assess the net productivity of a school fully controlling for student attributes. Chicago, Oakland, and New York have started closing the schools that have the absolute lowest scores and creating options for families and teachers, but few other districts have followed suit. The same districts (and New Orleans and Philadelphia) have also sought alternative providers for schools and built incubators for new schools. However, critics are right to claim that none of the options created can be considered “proven” (Gill, Zimmer, Christman, & Blanc, 2007).

Our public education system is based on assumptions of certainty: If we can only put enough money and good people into schools, they will work. Groups fight about financial allotments, teacher licensing, class size, and curricular materials, but all claim to know the right answer. Coalitions that prevail in state and local policy fights are sure their solutions will work and therefore see no reason to invest in close tracking of results or to encourage experimentation with alternatives. Thus, the top-line structure of our public education system is hostile to searching analysis, abandonment of existing structures, and creation of alternatives.

Resistance to new ideas discourages the kinds of rigorous research and development (R&D) necessary to create and prove options. This is not disastrous for groups whose schools work reasonably well. But for groups whose schools don't serve well, it prevents experimentation with new ideas. Although many competent and well-intentioned entities have created charter schools dedicated to the poor, the vast majority draws from conventional generalizations about “good schools.” In general, such schools strive to manage the conventional model well: They hire the best teachers and principals they can, strive to offer coherent instructional programs, and guarantee a safe and studious environment. Few offer new teaching methods, materials, or extensive use of technology. Many of these schools are more effective, but only slightly so, than the district-run schools from which their students came.

In the next section I suggest that to get dramatic improvements in performance, especially new options for children for whom schools currently do not work well, we need an institutional mechanism to generate new instructional models via formal R&D, as well as the other system changes just listed.

Practical Steps

In theory, the arrangement that best meets these criteria is a perfect market. If families could choose schools and teachers could move in an open labor market, the mechanisms needed to transfer people and money from less to more productive schools would be in place. If new providers could arise, and the ones with the most productive approach to instruction could come to dominate the market and make profits accordingly, all the incentives and opportunities for innovation and continuous improvement would be present. Of course we do not have anything like a perfect market in public education and are unlikely to get one.

As Chubb and Moe pointed out, a perfect market is unlikely to arise in a situation in which government controls spending, providers have vastly more information than consumers (and, I might add, no adult's interest perfectly matches that of a child). These conditions are endemic to public education. Even if markets arose in public education, it would be hard to keep courts from intervening on behalf of losers in normal competitive transactions (e.g., families that wanted to attend a school that had lost too many students to survive economically) and educators who felt they had job rights at such schools. We have already seen courts and legislators interfere with normal market processes attached to charter schools.

One could also imagine a centrally managed system with at least some of these elements. Central management could track spending precisely, monitor uses and results, authorize experiments with new ideas, and mandate transfers of funds and people from less to more effective methods. Some businesses at least try to operate in these ways. Intel tries to create innovations that will supplant its own current products in the marketplace and abandons product lines as soon as more productive ones are available. Many firms have abandoned cost allocation formulas in favor of exact tracking of expenditures and outcomes.

However, in government, central leadership is seldom as stable and authoritative as it is in private firms. Historically, politics has introduced constraints that hide real expenditure patterns and costs and protect existing programs from close scrutiny. As Paul Peterson once said to me, "Politics is about hiding things." Public education is now structured to hide resources, avoid scrutiny, and stabilize existing districts and schools both by controlling the movement of students and teachers and by increasing subsidies for schools that lose enrollment. Even if some district leaders move toward transparency and openness to experimentation, their successors, eager to please vocal constituencies like teacher unions, are likely

once again to protect, hide, and insulate people and institutions from performance pressures.

So how do we introduce marketlike elements to public education, at least enough to generate innovation and a constant search for better schools and better methods? We must not only envision a new system but also dispose of the well-funded and politically protected bureaucratic delivery system that now controls the money and owns the loyalty of millions of teachers and families.

Proposals to wave that system out of existence by creating universal vouchers are not working out politically (Moe, 2001). Suburban and middle-class voters fear that vouchers will make the schools in their communities worse by introducing into those schools students whose needs will erode school quality and by forcing some students now in good schools to move to worse ones. A more modest approach—consisting of a competing system of charter schools that will become so effective that it will draw masses of students from public schools—is also struggling with issues of quality and scale. The dominant system defends itself via politics, and the alternatives are not overwhelmingly better.

Bringing market elements into public education is analogous to bringing markets to a post-Communist economy. Some changes are possible right away, but others will fail because people do not know how to behave in a market or because market elements merge in monstrous ways with the existing system.

How do we move toward a public education system based on an assumption of uncertainty and a constant search for something better? What can we do to set up an inexorable movement in the right direction even if we cannot create all desirable changes at once? I suggest the need for three lines of action:

- Investment in R&D to develop and prove more effective instructional systems especially for children for whom schools don't now work.
- Use of charter schools as a means of market entry for new ideas, and as a way to permit field-testing of new instructional systems.
- Creation of a new policy structure that will make it more likely that superior methods will capture the market and force widespread changes in practice.

Taken together these actions can generate possibly more effective instructional methods and forms of schooling, and provide evidence about required amounts and uses of money.

Research and Development

In the early days of the choice movement, research and development was considered a natural byproduct of operating in a competitive environment with the freedom to innovate. However, as we have seen, nothing is automatic. Charters have little capacity to experiment with new approaches to instruction. Even groups

of schools organized into for-profit Education Management Organizations (EMOs) and nonprofit Charter Management Organizations (CMOs) have relied on good management of conventional instruction much more than on innovation. (A partial exception: Edison is reportedly experimenting with uses of online instruction that might reduce the staffing of each of its schools by one or two teachers).

The absence of serious R&D has handicapped the charter movement because it has at best weak proof that it can offer schools that will produce better results than regular public schools. Critics of the No Child Left Behind provisions requiring districts to consider charters as alternatives for children in failing schools get traction when they claim that charter schools might not be any better. In general, the lack of proven methods—and effective mixtures of teacher work, materials, and technologies that can be readily reproduced—is a major deficit in the charter movement.

Imagine how much more open parents and voters would be to charter schools if there were instructional models that lived within available budgets but offered highly effective instruction demonstrated through clinical trials. Such models might look conventional on the surface, combining disciplined teacher work, use of online instructional packages to teach subjects in which teachers are weak, detailed tracking of student progress on key skills, and rapid adaptation of instruction in light of individual student results. However, they might be highly unconventional, for example, delivery of most instruction online with limited use of teachers as diagnosticians and tutors.

Even more significantly, the lack of positive provisions for R&D makes it unlikely that our schools will ever solve the problem of educating children for whom conventional method and organization don't work. This problem is not likely to be solved by entrepreneurship or informal tinkering. It almost certainly requires a formal R&D enterprise analogous to those that develop medical therapies or new defense systems that integrate human and machine work in order to accomplish new missions.

In medicine and defense, new technologies do not simply emerge through tinkering on the part of practitioners. Specialized institutions (e.g., Defense Advanced Research Projects Agency [DARPA] and the National Institutes of Health [NIH]) organize R&D. These institutions work as intermediaries: They fill the space between lab scientists and small-scale inventors on one hand and end users (e.g., physicians, military units) on the other. Thus, for example, DARPA combines previously separate ideas about propulsion, sensors, data processing, structural materials, and aerodynamics into a whole system called an aircraft. It then subjects the new design to extensive tests and uses the test results to put pressure on the armed services to adopt the new system. NIH similarly builds new therapies, essentially systems, out of new discoveries in biochemistry, pharmacokinetics, and delivery devices, then pays for their evaluation and works to get them introduced into practice.

Defense and pharmaceutical industries also conduct R&D, but they depend on the intermediary institutions, and on special indirect cost recovery provisions in federal contracts that set aside money for R&D, to fund the transitions between isolated technologies and whole systems that can be sold and operated.

These intermediaries exist for three reasons: because basic scientists and inventors do not have the financial resources or the knowledge of field operations to build their discoveries into complete systems, because risks are high and failures are necessary, and because the end users have little incentive to try something that disrupts their operating routines or threatens to make cherished skills obsolete. Intermediaries have the funds to assemble multiple emerging technologies into systems, develop the systems, subject them to rigorous proof, and press for adoption of those (systems) that accomplish needed new tasks or do existing tasks better. (Rich's book *Skunk Works: A Personal Memoir of My Years at Lockheed* [Rich & Janos, 1994] is particularly eloquent about resistance to new systems and the need for rigorous testing and demonstration to spur adoption).

Parallels to education are strong. There are many inventors, from individual teachers to software companies, developing small instructional and testing modules. Paul Allen's APEX company has developed online AP courses but not programs for whole schools, and the independent online vendor K-12 targets a niche market: It was unable to enter the vacuum created by the destruction of New Orleans' brick-and-mortar schools. Home schoolers, entities seeking to serve school dropouts, and schools in remote areas have been open to heavy use of online instruction. But school districts have not been interested, except insofar as online instruction attracts children who might otherwise not attend school at all. Districts adopt technology applications piecemeal, as add-ons to existing courses, or for tutoring. School districts and unions resist any approach to instruction that would change the work of teachers or reduce the numbers needed. Entrepreneurs, understanding that there is money to be made in providing what districts want to buy, stick to piecemeal programs or marginal situations.

Thus in K-12 education, innovative ideas exist but they are seldom assembled into whole instructional systems, that is, plans for combining technology with student and teacher work in new ways. Nor are individual technology applications or whole instructional systems tested to the point that their effectiveness and best application can be considered proven. Moreover, there is no mechanism for moving new instructional systems into widespread use.

Earlier efforts to create something like instructional systems—the New American Schools initiative sponsored by businesses in the early 1990s and the federal government's Comprehensive School Reform Program—were not R&D efforts at all. Most designs were put into practice without testing, and few amounted to much more than ways of promoting teacher collaboration. Although many of the designs tried to increase achievement for low-income children, their implementation was so chaotic that it is impossible to say what worked and what didn't. As a result

we know little more about how to create effective instruction for disadvantaged children than before these initiatives started.

The charter sector is particularly handicapped by the lack of proven innovations. Charter leaders, like public school principals and superintendents, can choose from among many plausible but unproven theories about what will work with their students. They have trouble convincing skeptical government agencies that they should be trusted with a school, and once they get a charter, if their first ideas don't work well the only recourse is trial and error.

The intermediary function—finding possible technical applications and new ideas about teacher and student work, assembling groups of them into potential whole instructional systems, subjecting systems for rigorous test, publication of evidence of effectiveness, pressing for adoption, and monitoring field experience for further evidence of effectiveness and limitations—is missing in K-12 education.

A serious R&D initiative to identify promising new instructional systems would cost tens of millions per year, counting development costs of multiple alternative systems and testing costs including controlled trials with real students.

Government has pockets deep enough to pay for development and testing of many alternative systems and to tolerate the inevitably high rate of failure. However, federal government efforts to create NIH-like entities in education (e.g., the National Institute of Education in the 1970s and The Institute for Education Sciences today) have foundered on the same politics of competing certitudes that have rendered the public education itself unable to improve. Government-funded R&D in education is highly responsive to “the field” and tends to celebrate the current conventional wisdom rather than seek alternatives to it. Federal education research agencies have also been unable to overcome educators' resistance to real experiments with tight control of treatments and random assignment of students. Today's government-funded What Works Clearinghouse can identify studies that use strong quasi-experimental methods, but it has no power to create experiments.

I have suggested that major foundations (e.g., Gates and Broad) could also afford to make annual multimillion dollar R&D investments and could make a unique contribution by doing so. They are mulling the possibility, but the lure of continuing to pour money into the next hot idea or hero superintendent is very strong. It is not yet clear whether the mega-foundations will fund this. However, a much smaller philanthropy might fund such an effort if it were willing to concentrate its resources.

When asked to comment on the potential of a major R&D initiative in education, NIH and DARPA experts observe that the “uptake” problem in education is especially severe. School districts and state governments, driven by union politics, prefer to ignore ideas that would change teacher work. Parents want more effective schools, but they can easily be persuaded that smaller class size is the only way to improve instruction.

In contrast, there are strong political advocates for use of high technology in defense and medicine, and the public believes in it. Moreover, there is real evidence of success and failure in both fields, and dramatic consequences of failure to adopt the best methods (though in the defense case there can be many years between disasters that dramatize the need for innovation). In education, however, the providers resist outcome measurement and get away with laying responsibility for school performance on parents, neighborhoods, or society in general.

In this environment how can we move toward innovations that will produce more effective instructional systems and therefore give us real evidence about how much money is needed and how it should be used? Moving the whole public education system at once is too hard, and appealing to only the most innovation-minded teachers and administrators leads to short-term initiatives that are abandoned as soon as a key person tires or takes a new job. The key is to enter public education via the one part of it that has strong incentives to find and use performance-enhancing initiatives—charter schools.

Charters as the Tip of the Wedge

No matter how rigorous it is, an R&D initiative can do only so much. New programs can make a difference only if they are used. This is impossible in a public education system where money is obligated in long-term commitments to people and buildings and where adults are insulated from performance pressure.

Charter schools need to give families and teachers reasons to choose them. In the poorest inner cities, unfortunately, charter schools don't need to be particularly effective to attract families and teachers. They can offer a slightly safer and more studious environment, and that is enough to set them apart.

However, most charter school leaders are dedicated to meeting the needs of a particular set of pupils and would rather be more effective than less. They also face serious cost constraints (e.g., less money than the regular public schools with which they have to compete for teachers) and difficulty keeping teachers. Thus innovations that would make teachers more productive (e.g., uses of technology to deliver information and make linear presentations of material, leaving professionals to diagnose and tutor) could be highly attractive. In addition, hundreds of new charter schools start up every year; even if existing schools found it hard to change their staffs and uses of budgets, new schools are completely flexible and many see an advantage in being known as distinctive and innovative.

The R&D initiative just described could give charter schools the ideas and methods they need to compete effectively. Multischool providers (the EMOs and CMOs previously described) could gain a tremendous advantage if they could adopt proven, reproducible methods. Foundations that sponsor R&D can promote adoption of proven ideas by building new EMOs and CMOs around proven methods.

Charter schools could also serve as sites for full field-testing of instructional systems proven in clinical trials. As in medicine, large-scale use of a system would reveal interactions and consequences too rare to be seen in controlled environments. As in defense, field trials would reveal the need for adjustments in training and support and sharpen estimates of cost. As I have suggested to the major foundations, a final stage of the R&D process, which some intermediary must pay for, is close unbiased tracking of program implementation and student effects.

Today, however, charter schools are secretive and resist analysis. Although they must report good financial data, few create record systems that link student, teacher, and program characteristics to student outcomes. If charter schools are to become laboratories of innovation, they must open themselves in ways I have suggested the rest of public education needs to do. They too need to cooperate with constant tracking of student outcomes; student-level analyses of links among funds spent, programs experienced, teacher characteristics, and student outcomes; and analyses to identify less and more productive activities, schools, and people.

Charter schools are not funded for these activities, and many states exclude charter schools from their testing programs. Legislative action to make sure that all children in the state are tested at state expense and the same records are kept for all students is clearly needed. State budgets also need to include money for collecting information on charter school programs, teachers, and expenditures.

Existing charter schools will not welcome demands for data, though schools built around innovative instructional systems should be more receptive. Any school leader will rightly object that public school systems are staffed for such reporting while they are not. If states are not willing to defray the additional costs of reporting that charter schools must do, philanthropies might need to grant money for design and maintenance of school data systems.

Policy Change

Charter schools would be promising test beds for new R&D-based instructional systems even under existing laws. However, it is important to work toward charter laws and policies that create a level playing field so that charters are not so starved of money or hamstrung by regulation that they cannot compete effectively with district-run schools. A recent Koret task force book, *Charter Schools Against the Odds*, lays out a detailed policy agenda for making charters more effective and for increasing the competitive pressure they exert on district-run schools. Its elements, which overlap with but are not as demanding as those for a whole system based on uncertainty and on unending search for better methods, include the following:

- Equalizing funding for students in charter and traditional public schools via student-based, not program-based, state and local funding systems.
- Empowering new authorizers, including colleges and universities, mayors, and qualified nonprofits in states where school boards hold a monopoly on authorizing charter schools.
- Protecting charter schools from arbitrary denial of applications by establishing appeal processes, to a state agency or independent body, in each state.
- Eliminating arbitrary caps on the numbers of charter schools so that the number of charter schools depends only on the availability of competent and willing school providers.
- Eliminating fixed terms for charter schools in favor of provisions that make it clear a school's charter is valid only as long as it can demonstrate student learning.
- Eliminating bans on for-profit firms holding charters directly, in favor of common funding and oversight provisions for all charter schools, no matter who runs them.
- Allowing charter schools to employ teachers and administrators in whatever numbers, and with whatever mixtures of skills and experience necessary to deliver the school's instructional program. All authorizers have ample power to reject a charter proposal in which the staffing plan does not match the instructional methods to be used.

There is a clear need for a national legislative advocacy agenda, one pressing for needed changes in charter school laws in every state. As *Charter Schools Against the Odds* recommends, a coordinated 50-state agenda, modeled on the Business Roundtable's campaign for standards-based reform in the mid-1990s, could bring about conditions conducive to innovation and competition.

CONCLUSION

These three initiatives—an R&D intermediary, using charters as the point of the lance, and creation of a level playing field for competition—could set off a wave of innovation and escalating school performance. This, in turn, could tell Americans what they need to spend for effective schools, especially for students who don't now have them, and what higher levels of spending could bring. However, defenders of the existing system will do all they can to disrupt these initiatives, tilting the playing field against innovative schools and fighting the premise that R&D can produce validated, reproducible instructional systems. Unions and schools of education will certainly fight the ideas of clinical trials and random student assignment.

Given the resistance, there is no chance that the whole country, or even a whole state, would adopt all of the policy and funding measures just described. However, some localities (e.g., New York, New Orleans, Chicago) have already adopted student-based funding and other key policies. They might be ideal locales for an effort to use charter schools as the point of the lance for experimentation with new instructional systems. Other localities would have reason to imitate them if they reaped the benefits of improved schooling options for the most disadvantaged and gained greater clarity about productive ways to use public funds.

A well-funded and ambitious R&D intermediary is the one indispensable element that is missing everywhere. If it could be funded and isolated from political interference, it could produce real evidence about what is possible and what it costs. Linked to policy action to level the playing field for charter schools, and to CMOs and EMOs that will put innovations into practice, the products of R&D could include answers to now-unanswerable questions about educational effectiveness and cost.

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