

The Federal Role in Teacher Professional Development

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THE REAUTHORIZATION OF the Elementary and Secondary Education Act (ESEA) provides an opportune occasion to take a fresh look at the federal role in teacher professional development. Funds designed to improve teachers' professional prowess currently are tucked into a number of federally funded programs—programs, for example, for students living in poverty, for children with little or no English language proficiency, and for schools engaged in so-called whole school reform.

The largest federal professional development appropriation, and the only federal effort devoted entirely to this purpose, is the Eisenhower program. Initiated a decade and a half ago, Eisenhower has undergone substantial changes over the years in terms of level of funding, purpose, and mission.

Lessons learned from Eisenhower, considered alongside contemporary research on the type of teacher support likely to have the greatest impact on improving practice to raise student achievement, can inform a new federal role in teacher professional development. In brief, this new role would:

- Concentrate federal professional development dollars specifically and exclusively to support teachers' subject matter knowledge and mastery of subject-based pedagogy; and,
- Require that accountability for such dollars be based on an assessment of teachers' contributions to improving student learning.

This paper is not an evaluation of federally funded professional development, a comprehensive appraisal of the Eisenhower program, or a thorough review of relevant research. The purpose here is to put forth a set of ideas designed to spark discussion about ways in which a segment of federal dollars might more effectively be used to improve student achievement.

The First Eisenhower: 1984–94

The Eisenhower program was born in August 1984 as Title II of the Education for Economic Security Act (EESA). *A Nation at Risk*, the report of the National Commission on Excellence in Education, had been released the previous year warning that “a rising tide of mediocrity” threatened to engulf the nation’s schools.¹

Nearly three decades earlier, in 1957, Russia’s successful launch of *Sputnik*, the first man-made satellite to orbit the earth, had been the impetus for the National Defense Education Act (NDEA). Then, policymakers feared that inadequate science and mathematics programs in the nation’s public schools had allowed the Soviets to gain the technological upper hand. The threat was perceived to be a military one. If Russia could launch a satellite, Americans worried, surely it had, or soon would have, the technological capability to initiate a successful nuclear strike against the United States.

In the 1980s, the fear was economic, not military. Japan, a country once known for the shoddy quality of its goods, when “Made in Japan” meant “made to fall apart,” began to surge ahead of the United States in the competition to claim dominance in the global marketplace. The cold war had ended. The trade wars had begun.

In times of national crisis, America often turns to its schools for salvation. Title II of EESA was part of this response. If schools did a better job preparing students in mathematics and science, policymakers reasoned, the logical spillover would be that Americans could begin to gain a leg up on the global competition in a world increasingly dependent on advanced technology.

Title II federal funds were allocated specifically to advance professional development for mathematics and science teachers in elementary and secondary schools. Funding was justified on the basis of the pre-

sumption that increasing teachers' knowledge and skills in these areas would have a beneficial effect on improving students' math and science achievement levels.

The original intent of Title II was purposely both broad and specific. While funds were targeted to improve mathematics and science education, the program allowed school districts maximum flexibility within the bounds of math and science to design staff development programs to meet teachers' needs.² The program was funded at \$100 million in 1985, but Congress cut the Title II budget in 1986 to \$46 million.

Two years later, in 1988, the program was reauthorized as part of the Hawkins-Stafford Elementary and Secondary School Improvement Amendments to ESEA. Officially named the Dwight D. Eisenhower Mathematics and Science Education Act at that time, funding was increased to \$110 million.

In both the 1984 and 1988 authorizations, the lion's share of Eisenhower dollars was distributed to states.³ Money was allocated by means of a funding formula that took into account two factors: (1) a state's overall student population, and (2) the number of students eligible to receive ESEA Title I funding. Eisenhower, then, was established as a state entitlement.

Seventy-five percent of each state's Eisenhower allocation was designated as a "pass through" from the state's education agency (for example, state department of education) to local school districts. The remaining 25 percent was directed to a state-selected "state agency for higher education" that administered competitive grant programs among those of the state's colleges and universities interested in conducting Eisenhower-related activities for elementary and secondary school teachers. This setup—a proportional funding split between K-12 and higher education and a specific focus on improving mathematics and science education—would last until 1994 when Eisenhower was again reauthorized.

In the Midst of Reform

The first decade of the Eisenhower program, from 1984 to 1994, fell squarely in the midst of two cycles, or "waves," of the education reform movement that had been launched in 1983 with the release of *A Nation at Risk*. From the mid-to-late 1980s, the first wave of reform, national and

state-level education policy discussions and actions centered primarily on four aspects of education improvement: (1) developing and implementing higher and more rigorous academic standards for students, (2) designing new curricula around these standards, (3) ensuring that all students take larger numbers of academic courses—more math, more English, more science, more history, and (4) creating new kinds of assessments aligned with new standards and curricula.

These reform activities, despite their fervor and energy, produced decidedly mixed results. On the one hand, the intense focus on standards, curriculum, and assessments began to shift policymakers' and educators' attention away from educational inputs and toward measurable student outcomes. On the other hand, early reform efforts were based on the notion that if educators continued to do what they had always done—but did it harder, faster, and generally under stricter state scrutiny—improved student achievement would result. When this did not prove to be the case, reformers rededicated themselves to change and refocused their efforts on improving the conditions of teaching.

The late 1980s to about the mid-1990s marked the second reform cycle. *A Nation at Risk*, in criticizing teachers' limited professional decisionmaking authority and the relatively low level of teachers' salaries, had declared, "The professional working life of teachers is on the whole unacceptable."⁴ But little policy attention had been paid during the first cycle of reform to the work conditions that shaped the teaching career. By the end of the 1980s, policymakers and reformers began to zero in on the conditions of teaching. Many states raised teachers' salaries; teachers were provided with modestly expanded decisionmaking authority; and some limited opportunities were created for teachers to take on new professional roles without leaving the classroom.

The notion here was that if teaching began more closely to resemble a profession, with better compensation and a taste of the kind of discretion professionals in other fields enjoy, more competent people would be attracted to teaching and good teachers, who often left after just a few years in the classroom, would remain. Improving student achievement was the desired result. But despite much hard work and many good intentions, after a decade of these efforts, student achievement in the United States was not showing much improvement.

Results of the Third International Mathematics and Science Study (TIMSS) revealed the United States to be the only country that scored

above the international average at fourth grade and below at eighth grade. Eighth graders ranked nineteenth out of twenty-five countries; at the twelfth grade, U.S. students ranked near the bottom in math, above only students from Cyprus and South Africa. In science, eighth graders ranked twelfth out of twenty-five countries; at twelfth grade, they ranked sixteenth out of twenty-one countries. National Assessment of Educational Progress (NAEP) results were discouraging as well. They showed 40 percent of fourth-grade students scoring below the basic level in reading, nearly the same percentage of eighth graders scoring below the basic level in math. Likewise, more than 40 percent of twelfth graders scored below the basic level in science.

These first two cycles of education reform, then, framed the policy context for the first two Eisenhower authorizations. Policymakers and reformers concentrated on building policy structures to support education improvement—higher standards, new curricula, better tests—and altering some of the conditions of classroom teaching.

An Appraisal of the First Eisenhower Decade

A 1991 national evaluation of the Eisenhower program conducted by SRI International, as well as other evaluative work of the early Eisenhower years, offered a mixed picture of program results. On the credit side, Eisenhower cut a wide swath through the population of targeted K-12 teachers. Nearly one-third of all elementary and secondary teachers with responsibility for math and science instruction participated in some Eisenhower-funded activity during the 1988–89 school year.⁵

On the other side of the ledger, however, state departments of education and local school districts clearly had made the choice, in the way they expended Eisenhower funds, to trade quality for quantity. As the SRI team reported, state- and district-level Eisenhower funds generally were paying for low-intensity in-service training, averaging just six hours or less per participant.⁶ Most of this staff development was both generic and benign, focused on building awareness among teachers about emerging math and science standards, for example, or enabling elementary and secondary teachers to attend math- or science-related conferences. SRI found little evidence that these activities were having much impact on improving teaching or, by extrapolation, on increasing student achievement.

The picture for higher education Eisenhower professional development was somewhat brighter. College- and university-based Eisenhower projects, reported SRI, typically were more intensive than were their state or local school district counterparts. Each participant in an Eisenhower higher education program received approximately sixty hours of professional development, a tenfold increase over state department of education and local school district programs.

Moreover, college and university Eisenhower projects tended to be less generic, paid significantly more attention to the content of mathematics and science instruction, and were better designed than were district or state activities to have an impact on classroom practice. This latter finding may have, at least in part, resulted from the fact that more than half the Eisenhower college and university project directors made their academic homes not in schools of education, but in departments of mathematics, science, or related fields.

SRI's evaluation, while critical of many of the district and state uses of Eisenhower dollars, nonetheless attributed a number of advantages to the program:

1. Eisenhower had a wide reach. All states, nearly all school districts, and a substantial fraction of colleges and universities received funds.
2. The money was easy to obtain and flexible to use. With the exception of the higher education portion, which was allocated on a competitive basis, Eisenhower dollars were an entitlement to states and districts and allowed a wide range of professional development activities to be subsumed under the Eisenhower umbrella.
3. Eisenhower dollars substantially increased the array of math and science professional development opportunities available to teachers. The funds, for example, were a key resource in promoting teacher participation at state and local math and science professional meetings. For many teachers, especially at the elementary level, Eisenhower-funded meeting attendance was the first, and perhaps the only, opportunity to participate in sessions focused on mathematics and science education.
4. The program simultaneously targeted elementary and secondary education as well as higher education, thus encouraging collaboration among various sectors in the improvement of mathematics and science instruction.

Federal professional development dollars, then, in the form of the Eisenhower program, showed some modest benefits. However, measur-

ably contributing to improving student achievement did not seem to be among them.

Eisenhower's next reauthorization, in 1994, came in the midst of once again shifting education policy priorities. These priorities, as reflected in the new Eisenhower, profoundly influenced the shape of the program.

A New Reform Wave

By the mid-1990s, even though the American economy had made a near-complete recovery, American education had not. The focus on standards, curriculum, assessments, and the conditions of teaching clearly had wrought some educational benefits. Policy talk and action centered on implementing academic standards and new forms of student assessments. To some extent, more, and more capable, people were being attracted into teaching. In some states and districts, improved teaching conditions were beginning to staunch the flow of good teachers from the profession. Yet improved student achievement—the pot of gold at the end of the education reform rainbow—still lagged badly.

The policy tide began to shift again. Improving the quality of teaching catapulted to the top of federal and state education policy agendas. The rationale for this new attention to teaching quality was echoed in the common-sense mantra of the National Commission on Teaching and America's Future: "What teachers know and can do makes the crucial difference in what students learn."⁷

Improved teaching quality, as played out in policy, came to encompass three fundamental elements:

1. Better teacher preparation through more rigorous licensing requirements and teacher competency tests;
2. Standards for both beginning and accomplished teaching, enunciating what beginning teachers should know and be able to do through the Interstate New Teacher Assessment and Support Consortium (INTASC) standards and, likewise, what accomplished experienced teachers know and can do as demonstrated through certification by the National Board for Professional Teaching Standards; and,
3. Higher quality professional development, using research about effective teacher learning to shape programs designed to increase teachers' expertise in ways that lead to improved student performance.

The emphasis on higher quality teaching derived in large measure from a recognition on the part of policymakers and educators that when expectations changed for students, in terms of meeting tougher standards, they changed for teachers as well. If teachers were to be responsible for helping all students reach high standards, they would need to know more about the subjects they teach and about how to communicate that subject matter effectively to students.

This, then, was the education reform milieu that surrounded the next Eisenhower reauthorization.

The Second Eisenhower: 1994 to the Present

The Eisenhower professional development program was reauthorized in 1994, this time as part of the Improving America's Schools Act (IASA). Expanded in scope and purpose, the program was renamed the Eisenhower Professional Development Program. Mathematics and science were removed from the name.

In reauthorizing Eisenhower, Congress declared:

The federal government has a vital role in helping states and local agencies to make sustained and intensive high-quality professional development in the core academic subjects . . . an integral part of the elementary and secondary education system.

Thus, the new Eisenhower was to include professional development for teachers in all core academic subjects, those being defined by the federal government as arts, civics and government, economics, English, foreign languages, geography, history, mathematics, and science. Moreover, not only was Eisenhower funding to encompass the sweep of core subjects, but, responding to the SRI critique about generic activities of brief duration, program dollars were now also to buy "sustained and intensive" support for teachers.

In the 1994 reauthorization, the government enunciated a new set of principles that would undergird Eisenhower programs and funding:

1. All students can meet high academic standards.
2. Students in poverty should be taught to the same high standards as other students.
3. Schools must be held accountable for students' progress in meeting the standards.

These principles derived from two federal—as well as state—policy thrusts that complemented, or were complemented by, the focus on improving the quality of teaching. Namely, no students should be allowed to fall through the academic cracks, and districts and schools must shoulder greater responsibility for improving student achievement.

The Hope for a Coordinated Strategy

The White House viewed a reauthorized Eisenhower as part of its continuing effort to assist the nation in meeting the education goals first announced in 1989 as a result of President George Bush's education summit for governors held in Charlottesville, Virginia.

In particular, the Clinton administration saw expanded Eisenhower efforts as critical to achieving Goal 4:

By the year 2000, the nation's teaching force will have access to programs for the continued improvement of their professional skills and the opportunity to acquire the knowledge and skills needed to instruct and prepare American students for the next century.

and to assisting students to meet Goal 3:

By the year 2000, American students will leave grades four, eight, and twelve having demonstrated competency in challenging subject matter including English, mathematics, science, history, and geography.

and Goal 5:

By the year 2000, U.S. students will be first in the world in science and mathematics achievement.

The federal government's intent was that Eisenhower-funded teacher professional development would become part of states' systemic education reform efforts, focused around standards, curriculum, and assessments. The new federal legislation encouraged districts to coordinate Eisenhower activities with other ongoing education reform efforts and admonished them to construct professional development programs so as to maximize their impact on teachers' classroom performance.

Federally promulgated examples of activities authorized under the 1994 Eisenhower included providing seed money for agencies and organizations to expand their capacity to offer professional development; encouraging the creation of professional networks; supporting teachers

with professional development time and money; supporting partnerships among schools, consortia, school districts, and colleges and universities; and developing and identifying model professional development programs. In addition, Eisenhower funds could be used to align states' teacher licensing requirements with new standards; recruit underrepresented groups, such as minorities and women, into mathematics and science teaching; and train teachers in the effective use of educational technology.⁸ Finally, the legislation also authorized the secretary of education to waive many of Eisenhower's statutory and regulatory requirements to increase state and local decisionmaking authority.

As part of the reauthorization, the administration originally requested from Congress a 1995 funding level of \$800 million, on the assumption that Eisenhower could move beyond math and science if the program had a significantly increased annual appropriation. Congress approved a substantially lower amount, just under \$252 million, and added the proviso that, in any given year, the first \$250 million of Eisenhower funding must be dedicated to mathematics and science professional development.

By 1998, Eisenhower funding had reached \$335 million. More than three quarters of those funds (78 percent, or \$261 million) were sequestered for math and science purposes. Of the remaining nearly \$74 million, the federal government required that 7 percent, or approximately \$5 million, be used to improve reading instruction. States and districts were free to determine how to deploy their share of the final 15 percent, or \$69 million.

Distributing the Dollars

In addition to expanding the scope and purpose of the program, the 1994 Eisenhower reauthorization also altered, to some extent, the way in which state and local funds are distributed. Despite the SRI finding that college and university Eisenhower offerings tended to have greater impact on improving teaching, the new regulations increased the states' Eisenhower allocation from 75 percent to 84 percent of the dollars and reduced the college and university share from 25 percent to 16 percent.

Money continues to be allotted on a formula grant basis, calculated by using a state's previous year's Title I funding and the total number of students—both public and private—in the state.⁹ States use the same allocation formula to distribute money to school districts as the federal gov-

ernment uses to distribute money to states; that is, a combination of total pupil population and the number of Title I–eligible students. Any district whose share of Eisenhower funds is less than \$10,000 must be part of a consortium of similarly funded districts.

Current regulations also require that states “pass through” no less than 90 percent of Eisenhower funds to local school districts. Of the remaining 10 percent, 5 percent may be preserved by the state for administrative costs incurred as a result of overseeing the program. Only 5 percent may be used for state-level activities, which the federal government suggests include revising teacher licensing requirements, providing teachers with financial incentives to seek advanced certification through the National Board for Professional Teaching Standards, and developing and supporting regional and statewide teacher networks.

Districts are required to use at least 80 percent of their share of funds for school-based professional development. The remaining 20 percent may be used for districtwide activities. Local activities, like those at the state level, must be tied to state academic standards and designed to improve teachers’ classroom practice.

The 1994 reauthorization also includes a cost-sharing provision. At least one-third of the cost of district-provided Eisenhower professional development must come from sources other than Eisenhower funds. Finally, though Eisenhower money is an entitlement, each school district must—at least every three years—submit to the state education department an application detailing how the district intends to use its funds.

College and university Eisenhower dollars continue to be disbursed on a competitive basis by a designated state higher education agency. In addition to institutions of higher education, nonprofit organizations, such as museums, may compete for these funds.

The Accountability Provision

For the first time in Eisenhower’s history, the 1994 reauthorization includes a form of accountability for the dollars. Each school district must develop specific measurable performance indicators designed to assess the degree to which Eisenhower-funded professional development is meeting its avowed purposes.

Sample indicators suggested in the regulations include the following:

—Teachers show evidence that participation in Eisenhower professional development activities improved their knowledge and skills.

—District-level Eisenhower professional development is aligned with content and student performance standards.

—Significant proportions of teachers from historically underrepresented groups and teachers of high-poverty children are involved in Eisenhower-funded activities.

Every three years, states and districts must prepare a report for the federal government documenting progress on the performance indicators.

A Preliminary View of the Effects of the 1994 Reauthorization

Information about how the Eisenhower program has operated, and what its effects have been since the 1994 reauthorization, is just beginning to trickle in.¹⁰ A new three-year national evaluation, commissioned by the U.S. Department of Education from the American Institutes of Research (AIR), is under way and is slated to be completed by April 2000.

Despite the relative paucity of data, some information is known. Using data gleaned from the first of AIR's evaluation reports, consisting of case studies in six districts, and reports the states submitted to the federal government describing their uses of Eisenhower funds, a preliminary picture of the current Eisenhower program can be constructed. Three features seem evident:

1. Eisenhower in most states still focuses largely, although not exclusively, on mathematics and science.

States report that 76 percent of their Eisenhower dollars are dedicated to math and science professional development, as is 60 percent of college and university Eisenhower funds.

While the intent of the 1994 Eisenhower changes was to integrate that program with other education reforms, according to the AIR study, Eisenhower's relationship to other state and district education reforms is essentially to support the math and science components of these efforts. AIR posits that much of the continuing math and science focus results from the fact that many state and district Eisenhower coordinators are math and science specialists. Moreover, while professional development dollars are available in a number of the core academic areas, Eisenhower remains one of the few reliable sources of professional development for mathematics and science education.

2. Eisenhower funds support a wide, and perhaps expanding, array of professional development opportunities for teachers. However, the extent to which Eisenhower programs are designed to have an impact on teachers' classroom practice remains an open question.

More than 96 percent of the nation's school districts receive Eisenhower funds. Some Eisenhower-funded activities—workshops, institutes, conferences, university courses—are traditional. Others, such as coaching, mentoring, and teacher study groups, are less so.

While AIR reports that Eisenhower activities are more sustained and intense than was previously the case, states' reports suggest otherwise. According to the states, more than half the professional development funded through Eisenhower (56 percent) lasts one day or less.

In addition, AIR notes that Eisenhower-funded activities generally are aligned with state and district standards, as was intended by the 1994 reauthorization. However, while professional development in the core subject areas is the federally intended thrust of Eisenhower, only a small portion of the program's funded activities emphasizes subject matter per se. Many Eisenhower programs, apparently, are still of the SRI-criticized generic variety.

3. Federal efforts to hold states and districts accountable for the results of Eisenhower-funded professional development have met with less than successful results.

In planning Eisenhower activities, states report that districts often take into account student test scores as a way of pinpointing teacher needs. However, little district- or state-wide planning and evaluation are based on locally developed performance indicators, as the Eisenhower program now requires. States report confusion about how to develop indicators and how to design a measurement system for program-specific professional development. The bottom line, according to AIR's preliminary findings, is that little accountability exists for the results of Eisenhower-funded professional development.

One could conclude, after reviewing these findings, however preliminary, that the Eisenhower program should simply be allowed to sunset and that the prospect of federally funded professional development having a beneficial effect on teachers' classroom practice is dim. That conclusion, however, would be premature. A look at the way in which one state—California—deployed its Eisenhower dollars before and after the 1994 reauthorization provides some valuable lessons.

The Eisenhower Program in California

California is a state that often exemplifies Mr. Toad's wild ride. Seemingly in perpetual motion, the state's citizens both grimace and gloat when non-Californians are heard to remark, "Everything that happens anywhere in the country begins in California."

A Little State Context

The state's numbers are impressive, and daunting. The world's seventh largest economy, California is home to one of every eight American schoolchildren. Nearly 6 million kindergarten through twelfth-grade students are enrolled in the state's public schools, and that number is expected to increase by another 15 percent over the next decade.

Twenty-five percent of California's schoolchildren live below the federal poverty line. Eight of every twenty qualify for free and reduced-price lunches.

By the turn of the century, Hispanic students (who now compose 40 percent of the school population) will be the majority. Many of these children come to school with limited or no English language skills. Currently, one quarter of all California children enter school not speaking English. In the 650,000-student Los Angeles Unified School District alone, nearly half the children (46 percent) districtwide, and 60 percent at the elementary level, have limited proficiency, or none at all, in English.

Like many states, California is experiencing a teacher shortage. The problem is an immediate, not a prospective, one. Increasing enrollment, coupled with policies such as class-size reduction, has created a situation in which thirty-one thousand teachers—10 percent of the state's teaching force—are teaching on emergency permits.

Despite its \$30 billion annual price tag for public education, California's per pupil expenditures are below the national average. While California in the 1960s ranked among the top ten states in annual per pupil spending, the state spends less of its personal income on schools now than it did a generation ago. Compounding the school funding dilemma, local citizens have virtually no ability to raise money for their schools. As a result of a combination of court decisions and voter initiatives, local revenue raising is limited to special use taxes (called parcel taxes), which require a two-thirds affirmative vote to be enacted.

California's reputation as a trend setter is well earned and remains intact. For years, government by initiative has been one of the state's favorite pastimes. Californians have enacted amendments to the state's constitution to reduce property taxes (the now-famous Proposition 13), cap state and local spending, require a minimum percentage of state revenues to be dedicated to public schools, abolish affirmative action in public education and employment, deny educational services to the children of illegal immigrants (the courts, so far, have prohibited implementation of this), restrict bilingual education, and most recently, ban the slaughter of horses for human consumption. As former *Sacramento Bee* editorial page editor Peter Schrag notes, "California does very little of consequence without excess."¹¹

A Reform Roller Coaster

California was once ahead of the education reform curve. By 1983, when higher academic standards were just a twinkle in the policy eye of most states, California had already begun the hard work of creating standards, developing curriculum frameworks, and rethinking student assessment.

But California's road to education change has been anything but smooth. For good or ill, the vagaries of politics often have held sway over reform. The state has been blessed, or cursed, with vocal, and sometimes colorful, high-level policy actors who have latched on to the education cause in a variety of ways: governors who have taken a particular interest in—some would say launched a vendetta against—public schools; an activist legislature prone to specify instructional pedagogy in policy; a governor-appointed state board of education, which in recent years has flexed its policy muscles and fanned the flames of the much-publicized "curriculum wars," most recently fought over mathematics; and constitutionally elected state superintendents of public instruction with their own agendas rarely in accord with the governor, state board, or legislature.

When Gray Davis was elected governor in November 1998, the first Democrat in sixteen years, he vowed to make education his top priority. Immediately upon being sworn into office, the new governor called the legislature into a special session devoted to education. Four statutes emerged: establishment of statewide reading institutes; peer review as a

means to reshape teacher evaluation; a high school exit examination for all students; and a new statewide, school-by-school accountability system.

Davis had run on a platform of improving California's sadly sagging public school system. The shift in the 1980s to more rigorous academic courses in the core areas (spurred, at least in part, by the state university system's tougher admission requirements) had resulted in larger percentages of students enrolling in more academic courses, more students taking Advanced Placement classes and passing the tests, and slight increases in Scholastic Assessment Test (SAT) scores. Nonetheless, putting a positive spin on student achievement results stretched the bounds of credulity to the breaking point.

National Assessment of Educational Progress results placed California second to last, tied with Mississippi and only slightly ahead of Louisiana in reading. Fourth and eighth graders placed well below the national average in both science and mathematics. Results of the new statewide exam, given for the first time in 1998, were not much more encouraging. Students scored below the national average in reading, math, and science, and they lagged well behind in spelling.¹²

Eisenhower in California: 1984–94

Teacher professional development in California, as elsewhere, tends to be low-impact and generic. A 1987 study of teacher professional development statewide had concluded that most of what passed for staff development in California was unlikely to influence positively teacher practice. Most professional development programs offered in districts and by the state were organized in ways that reinforced existing patterns of teaching and conventional structures of schools, did little to expand teachers' horizons in terms of rethinking their instructional strategies, and tended to be offered as single sequence, one-shot activities with little follow-up and coaching and insufficient lasting effect.¹³

The Eisenhower program, however, in the decade from 1984 to 1994, had a different flavor. California used federal dollars to support state and local efforts to improve mathematics and science education by focusing on the content of mathematics and science instruction.

Whereas the SRI nationwide assessment of Eisenhower had shown that many states and districts were using these federal dollars for professional

development nominally centered on generic math and science, a 1993 evaluation of California Eisenhower by Policy Analysis for California Education (PACE), a joint University of California at Berkeley–Stanford University education think tank, revealed a different pattern. Eisenhower money in California was being used specifically to leverage the state’s mathematics and science frameworks.¹⁴

California had adopted frameworks in the mid-1980s with much fanfare and little or no teacher professional development. Teachers were simply instructed to “Go forth and teach” what amounted to an entirely new curriculum in most of the core subject areas. Eisenhower dollars were used to partially fill the professional development gap in math and science.

Districts reported that the state’s mathematics and science curriculum frameworks were the most significant factor affecting school districts’ planning for and use of Eisenhower money. Eisenhower-funded professional development, in other words, was shaped by state policy regarding what California expected students to know and be able to do in the areas of science and mathematics and, by extension, what the state expected teachers to know and be able to teach in these areas. Cited by three quarters of the state’s nearly one thousand school districts as the primary source of funding for math and science improvement activities, Eisenhower-funded professional development contributed to steady, albeit slow, changes in mathematics and science teaching.

The power of Eisenhower in California is again illustrated by the ways in which the state made use of dollars that remained in Sacramento with the Department of Education and those that were part of the higher education allotment.

The competitive portion of California’s Eisenhower program is administered by the California Postsecondary Education Commission (CPEC). Nonprofit organizations and all three of California’s systems of higher education—community colleges, the state university system, and the University of California (UC)—vie for CPEC-held Eisenhower funds.

Before 1994, the California Department of Education and CPEC pooled their resources to administer joint state competitions and encourage cooperation among colleges, universities, nonprofit organizations, and local school districts. Math and science projects involving UC Berkeley’s Lawrence Hall of Science and San Francisco’s interactive science museum, the Exploratorium, for example, resulted from such collabora-

tions. Professional mathematicians and scientists became involved in the public schools in programs designed to help teachers gain more math and science knowledge and use that knowledge in implementing the state standards and frameworks.

CPEC—Department of Education grant awards were substantial, generally in the range of \$250,000 a year for each of three years. These amounts were, in the words of one California Department of Education official, “large enough to really get something started—to create communities of people who could continue into the future.”

Four of these initiatives illustrate this point:

—Teaching Opportunities for Partners in Science (TOPS) was a joint project of Columbia Community College and the San Joaquin County Office of Education. The goal of the project was to improve the delivery of science education to students in twenty-four rural school districts in four California counties. TOPS placed twenty-six retired scientists in elementary schools to provide specific science content expertise and offer professional development to teachers based on science education activities developed by the teachers, scientists, and local community college faculty.

—The Los Angeles Mathematics Initiative was part of a cities and urban district initiative focused on metropolitan areas in which at least 70 percent of the students were members of racial and ethnic minority groups. The Los Angeles initiative funded teacher mathematics academies, each of which lasted a minimum of four days and focused on a particular curricular strand, such as fractions or problem solving, that was part of the state standards and frameworks. Academy instructors were experienced classroom teachers with math backgrounds who were available following the sessions to serve as ongoing resources to teachers as they implemented in their classrooms what they had learned in the academies. In addition, the Los Angeles initiative established a math resource center in each school, consisting of a library of math curriculum materials and a directory of experts and organizations willing to provide assistance to classroom teachers.

—The Informal Science Education Centers Initiative was a cooperative effort of a range of nonprofit organizations, including museums, aquariums, planetariums, and zoos. One of the projects resulting from this initiative was led by San Francisco’s Exploratorium in consortium with San Francisco State University and San Francisco City College. The first

awardee of grant money founded the Mission Science Workshop, a community-based interactive science center that provided monthly in-service programs for area teachers, a two-week summer science institute, and field trips for teachers to learn how to use neighborhood resources for teaching science. This effort was so successful that the National Science Foundation awarded a multimillion-dollar grant to establish ten similar community-based science centers around the state.

—The Teacher Achievement Award Program (TAAP) provided seed money to teachers and teams of teachers to develop and implement science curriculum based on the California science standards. Teachers were given resources and time to begin to put flesh on the bones of the science curriculum framework. Some projects not only were implemented in California classrooms, but they received national recognition as well. One TAAP grantee was awarded the Disney Science Teacher of the Year prize for developing a multimedia curriculum exploring nuclear fusion.

Summing Up the First Decade

The first decade of the Eisenhower program in California concentrated heavily on improving mathematics and science education by improving the subject matter knowledge and subject-based pedagogy of classroom teachers, particularly those at the elementary level. Eisenhower-funded professional development took the long view. Built into the program was the recognition that teaching improvement leading to student achievement gains required steady, sustained effort; that the communities of mathematics and science professionals had much to contribute to this work; and that professional development needed to be grounded in expectations about what teachers needed to do in the classroom to help students meet specific academic standards.

Following the 1994 reauthorization, Eisenhower in California began to show a different face.

A Shift in Focus: 1994 to the Present

No new evaluation of Eisenhower has been conducted in California since the PACE study of the early 1990s. But anecdotal evidence suggests that, since the 1994 federal reauthorization, the federal shift in Eisenhower has been reflected in the state.

While state officials report that most of California's \$35 million in Eisenhower funding continues to be directed to math and science education, tracking Eisenhower footprints in school districts is difficult. With little federal direction, there is little state support for mathematics and virtually none for science education.

California's state-level Eisenhower program, which formerly was staffed by three to four math and science specialists, is now overseen by one staff person as part of his general responsibilities for the state's Coordinated Compliance Review for all state and federal funds. For inexplicable reasons, the program is crowded into the Department of Education's overtaxed Secondary Education Unit, even though a heavy emphasis of the program has been at the elementary level.

Many elementary schools in the state have now all but eliminated their science programs. They are likely to reappear once the state again tests students in science. But that will not be for another couple of years, and even then, fifth grade is the only elementary grade at which science will be tested.

In a way, the state behaves schizophrenically. While the Department of Education does not promote a math and science focus, neither does it encourage districts to spend Eisenhower money for subjects other than math and science professional development. But federal Title I regulations make the state's suggestions somewhat empty.

Schoolwide Title I schools—those in which half or more of the students are Title I-eligible—are allowed to waive all Eisenhower regulations. As a result, in some California Title I schools, 95 percent of Eisenhower funds are spent, for example, on reading improvement.

Reading is the singular professional development focus in the state. Programs to help teachers teach reading better tend to center on strategies for reading instruction, certainly a worthy endeavor in itself. But this is reading divorced from content. The state is likely to pay a price for all but abandoning improving teacher knowledge and skill in the other core academic areas.

The California Postsecondary Education Commission-administered programs have fared little better and, in some ways, represent a sadder story. Some of the competitive grant programs continue to survive on their own momentum, but without state support or funding.

California's higher education Eisenhower program has been transformed into the Eisenhower State Reading Grant Program, with most of

the CPEC Eisenhower money devoted to this purpose. In an effort to be all professional development things to all people, remaining Eisenhower higher education dollars are funding the California Reading and Literature Program, Mathematics and Science Implementation Projects, and planning grants for arts, civics and government, economics, English, foreign languages, geography, and history. Individual grants are no longer awarded in the \$250,000 range; the average is now \$20,000, or up to \$50,000 for statewide collaborative grants, hardly enough to make a difference or sustain a program.

In sum, Eisenhower in California has become more like, than unlike, the state's other professional development efforts. Programs once content-rich are now significantly more process focused. Professional development dollars that formerly were targeted to increasing teachers' subject matter knowledge and subject-based pedagogy in mathematics and science are now typically folded into funds expended on more generic professional development offerings.

California is concentrating on reading improvement. To be sure, there is nothing wrong with focusing dollars on improving reading instruction. This is a need and a priority. The danger is in assuming that teaching reading, to the exclusion of academic content, is sufficient.

As new state tests come on line, mathematics, science, and other academic subjects will once again be spotlighted. But structures that were in place, at least in math and science, to support increasing teacher knowledge and skill in these areas, once dismantled, will be difficult and time-consuming to reconstruct. The clear and consistent message Eisenhower formerly communicated—that improving mathematics and science education is an important goal—has been lost in the policy noise of the moment.

Lessons from Eisenhower

When the Eisenhower program was first initiated in 1984, it was meant to concentrate these federal professional development dollars on improving mathematics and science education. The problem was not that states and districts purposely frittered away the dollars, but that they did not then, and do not now, target Eisenhower dollars in ways that are likely to contribute to improving student achievement.

This situation does not result from inattention or malice, but more likely from two conditions: (1) lack of knowledge on the part of state and local policymakers about how to deploy professional development dollars most effectively and (2) little or no required accountability for the funds.

The 1994 Eisenhower reauthorization did not improve this situation. If anything, it probably made it worse. Expanding the focus to all core subjects has had little impact on the nature of professional development offerings. Too broad a focus is akin to no focus at all. Even in places such as California, where Eisenhower-funded professional development funds once were concentrated on increasing teachers' subject matter knowledge and skills in the designated academic content areas, expansion of the program served to dilute its focus and likely mitigate its impact.

Finally, federal accountability requirements, while well intended, are not serving their expected purpose. Indicators are vague and difficult for states to define. They are categorical in nature, centered only on the Eisenhower program even though federal regulations encourage coordination of Eisenhower with other education reform efforts. And Eisenhower accountability, as measured by progress on Eisenhower-specific indicators, are yet another add-on for states, a kind of paperwork requirement for federal funds that, in the real world of schools and districts, seems artificial and forced.

The Eisenhower program, in its current guise, is too broad, particularly given the level of funding. Moreover, the program ignores research on the critical link between teachers' subject matter knowledge and appropriately constructed professional development. Combining a sharper focus with research-based practice can chart a new, and predictably more effective, role for federally funded professional development.

Learning from Research

It seems axiomatic: Teachers cannot teach what they do not know. Studies reveal the importance of teacher preparation and expertise. Teacher qualifications—qualifications in these studies being defined as performance on basic skills tests and completion of teacher education coursework and clinical experiences—are said to account for 50 to 90 percent of the variation in student achievement.¹⁵ Yet more important,

beyond these general standards, studies confirm that teachers' subject matter knowledge counts.

Conventional wisdom long held that what teachers need to know and understand about a subject is, by and large, determined by the grade level they teach. Elementary teachers, according to this view, do not need to possess in-depth knowledge of mathematics or science or history because the level at which they teach these subjects is so basic. Even high school teachers, it was presumed, need not be experts, but only modestly conversant with the subjects they teach given that many courses are merely introductory or simply survey the broad landscape of a subject without digging too deeply into any aspect of it.

These assumptions derived from a time when teaching was thought to be a generic activity, a set of learned skills independent of subject matter. Given a standard kitbag of instructional techniques, the thinking went, anyone could teach anything to anybody. Research has shown these assumptions—both about the importance of subject matter competence and the art of teaching—to be mistaken.

A critical link exists between teachers' own knowledge of subject matter and the skills that enable them to translate subject content into effective classroom learning activities.¹⁶ What teachers know and understand about content shapes their choices about instructional materials and strategies. What teachers know about content also significantly influences the level of skill they are able to bring to the tasks of diagnosing student needs, developing interventions when students falter academically, and assessing student progress.¹⁷

Teaching is now a harder, more intellectually demanding job in a system of standards-based education. The need to know, and know well, their subjects is an ever clearer imperative for elementary and secondary teachers. Yet many teachers in American classrooms today are not well-versed in any subject. Many others are teaching out-of-field.

Underpreparation and the Persistence of Out-of-Field Teaching

More than half the nation's teachers hold bachelor's degrees in the field of education. These individuals completed undergraduate majors that may have required them to know a little about a number of subjects, but not very much about any of them. This problem is particularly acute among elementary instructors. Two-thirds of teachers in grades kindergarten

through five majored in education.¹⁸ Among middle school teachers in grades six to eight, many of whom are teaching in subject-specific departments, nearly one-half hold degrees only in education.

Even when teachers hold degrees in a specific academic area, often that is not the subject they are assigned to teach. In any given year, out-of-field teaching is occurring in more than half the secondary schools in the United States. In each of the fields of English, mathematics, and history, every year well over 4 million secondary-level students (grades seven to twelve) are taught by teachers with neither a major nor a minor in the field they are teaching.¹⁹ Mathematics and science, the fields for which the Eisenhower professional development program originally was designed, provide a vivid illustration of the problem:²⁰

—One-third of all secondary mathematics teachers have neither a major nor a minor in math. Fully half the eighth graders in public schools are taught by teachers with neither a math major nor minor.

—Twenty percent of science teachers have no major or minor in any science field. Half of those teaching physical science (chemistry, physics, earth science, space science) lack a major or minor in any of these areas. A third of the teachers teaching life sciences (for example, biology) have neither a major nor minor in any of the life sciences.

The problem of teacher misassignment is additionally compounded by issues of poverty, race, and student achievement levels:

—In high-poverty schools, 43 percent of the math teachers have no major or minor in math, compared with 27 percent in low-poverty schools.

—In schools with high concentrations of poor students, nearly two-thirds of the physical science teachers (65 percent) have neither a major nor a minor in physical science, compared with about 50 percent in low-poverty schools.

—Students in schools with the highest minority enrollments have less than a 50 percent chance of being taught by a mathematics or science teacher with a license or degree in the field they teach.²¹

—More than a third of low-track math students are taught by teachers with no math major or minor, compared with 20 percent in the upper track.

Even teachers who are teaching in areas they have studied do not necessarily feel adequate to the task before them. A recent study found that

just 36 percent of teachers overall (including those who are teaching subjects for which they are ostensibly prepared) report feeling very well equipped to implement state or district curriculum and performance standards.²²

One can reasonably conclude, therefore, that teacher subject matter knowledge makes a difference; teaching to the more rigorous academic standards now in place in most states requires teachers to have deeper content knowledge; and many teachers lack adequate subject matter knowledge or are assigned to teach subjects other than the ones for which they are prepared. These findings point to a critical role for well-defined professional development programs.

Making Professional Development Matter

It was long believed that the support of practicing teachers was a matter of providing periodic, and generally brief, staff development experiences designed to acquaint teachers with new requirements or promising programs or help them solve particular problems of practice. This description still defines standard professional development fare for most teachers.

Data from the 1993–94 federal Schools and Staffing Survey, for example, reveal that more than 70 percent of teachers participated in staff development programs lasting less than a day, which introduced them to state standards or equipped them with information about particular strategies, such as cooperative learning.²³ Only about a third of teachers reported participating in long-term professional development or programs focused on the subjects they were teaching.²⁴ Most teachers, when they receive anything at all, are treated to professional development lite.

Something of a consensus, derived from research, has emerged about what constitutes effective professional development.²⁵ Programs that are likely to increase teacher knowledge and skill and contribute to improving student learning have a set of common qualities:

1. Curriculum-centered and standards-oriented. Professional development needs to be about something, and that something is not process. Effective staff development programs revolve around the subjects teachers teach, the curriculum for which they are responsible, and the standards they are to help students meet.

2. Provide opportunities for teachers to become deeply immersed in subject matter. Teaching is an intellectual pursuit, requiring engagement in content. Good professional development recognizes and honors this.

3. Continuous, sustained, and cumulative. One-shot workshops, one-day courses, and one-time lectures do little to improve teaching practice. To have effect, staff development programs need to be both long term and long range.

4. Directly linked to what teachers do in their schools and their classrooms. Effective professional development makes the connection between subject matter and pedagogy, between the content of instruction and instruction itself. And it is practical. It provides information and techniques teachers can readily apply in their classrooms.

There is also agreement that teachers need different kinds of support—and different kinds of professional development—at various stages of their careers. A novice just entering teaching needs the fundamentals, such as classroom management and lesson planning. A teacher with a bit of experience is prepared to delve more deeply into subject matter and different forms of pedagogy. A seasoned veteran can profit greatly from well-designed professional development but does not need—and is unlikely to accept—the same kinds of in-service training as the beginner.

Effective professional development, which engages teachers in serious content-based discussion of pedagogy and curriculum, has been shown to improve teacher practice in ways that contribute to improved student achievement. District 2 in New York City has marshaled professional development resources from the district's general fund budget, has focused them on improving teaching in designated content areas, and has begun to see results.²⁶

David K. Cohen and Heather C. Hill, in an extensive research project, studied California elementary teachers and their efforts to implement the state's mathematics frameworks. Many of these teachers were under-prepared to teach the required mathematics curriculum.

Teachers who participated in generic workshops, such as cooperative learning, or professional development that had a mathematics theme but dealt little with mathematical content or pedagogy—for example, Family Math, which helps teachers involve their students' parents in math learning, or EQUALS, which deals with gender, class, and racial inequal-

ities in math classrooms—did not change their practice in ways that would impact student performance. However, when teachers were provided with ongoing professional development structured around specific mathematical concepts they would be required to teach, such as fractions, teacher practice improved and student achievement increased.²⁷ The content of professional development, concluded Cohen and Hill, makes a difference to teachers' practice, and that practice makes a difference to student achievement.²⁸

A New Vision for Federally Funded Professional Development

Teacher professional development is an appropriate use of federal funds. While education is not a constitutionally mandated federal responsibility, the federal government does have an obligation, in preserving the social and economic health of the nation, to promote and support education improvement.

Federal support of professional development sends an important message: Continuous teacher learning is a key determinant of improving student achievement. That message is particularly important to states and districts in times of fiscal crunch when professional development too often is the first budget category to be eliminated.

This is not to imply that just any professional development will do. Federally dedicated resources need to be put toward purposes with some track record of proven effectiveness.

As the Cheshire Cat said to Alice, "If you don't know where you're going, any road will take you there." If the federal government cannot articulate a clear and consistent purpose for professional development dollars, then results of those expenditures are likely to reflect that foggi-ness of intent.

With the foregoing in mind, a two-pronged proposal is offered for federal professional development dollars:

1. Target federal professional dollars specifically and exclusively to support increasing teachers' subject matter knowledge and mastery of subject-based pedagogy.

2. Base accountability for federal professional development dollars on teachers' contributions to improving student learning in targeted subject areas.

Targeting the Dollars

A tempting case can be made that states should have complete latitude to determine how best to improve teacher practice in their own locales. To some extent, states know better than the federal government, districts know better than states, and schools know better than districts. Nonetheless, the temptation to allow complete professional development freedom should be avoided.

If there is one crying professional development need—one need that, if remedied, offers the most promising prospect of improving student performance—it is increasing teachers' knowledge of the subjects they teach and enhancing their repertoire of subject-based pedagogical skills. Without teachers who are well versed in their subjects and know how to teach those subjects to their students, nothing much else in the realm of reform matters. All of the governance changes, political exhortations, system tweakings, and process foci combined will not make as much difference in ratcheting up levels of student learning.

Should federal professional development dollars specify the subjects to which states, and districts, ought to pay attention? The answer is both yes and no.

To abandon totally the focus on improving mathematics and science education seems foolhardy. These subjects are unquestionably important, both in their own right and in the ways in which studying math and science equips students with important and transferable skills, such as developing an inquiry orientation to learning and understanding the sequential nature of problem solving.

However, states ought to have some freedom to choose. They ought to be able to decide how to spend subject-based professional development dollars to meet particular state needs or priorities.

Here, then, is a possible way to proceed:

Increase the federal professional development appropriation to at least \$800 million. Require that the first \$500 million focus on math and science. Math and science achievement are still far from where they ought to be. Moreover, federal funding remains one of the few sources of dollars for math and science teacher professional development.

Allocate at least an additional \$300 million for academic areas other than math and science. Not all of this \$300 million would need to come from a new federal appropriation. The federal government should review

all of its current professional development funding, all of the dollars in various pots and programs, and give serious consideration to consolidating that funding into a single law, provision, or title.²⁹ In other words, decategorize professional development so that these education improvement dollars are not defined program by program.

Require states, in requesting federal professional development funds, to indicate the content area or areas, in addition to mathematics and science, on which they plan to focus. States might choose English, or history, or any of the other academic content areas. States must be clear about how they intend to concentrate their federal professional development dollars. And then they must know that they will be held responsible for results those dollars produce.

Tackling the Accountability Conundrum

The federal government should reasonably be expected to know what it is paying for. Determining how to assess the federal investment in professional development is the accountability conundrum.

Evaluating professional development is a tricky proposition. Too often appraisal revolves around whether participants enjoy the program, think it might be useful, and learn something new. Sometimes professional development is assessed on the basis of whether teachers acquire new knowledge and skills, and even whether classroom practice changes. But the real test for teacher professional development is, “Do students learn more?”³⁰

An indicator system, such as that of the Eisenhower program, is not adequate. These indicators are both overly program-specific and viewed by states as just another federal paperwork requirement not linked to states’ own education improvement work.

Ultimately, then, the measure of success of professional development is the extent to which it contributes to improved student performance. That link, between professional development and student learning, is not forged by a simple one-to-one correspondence. Most often student achievement is measured by scores on standardized tests. That is somewhat problematic in itself: Tests are not necessarily aligned with state standards and curriculum; they display only a sample of student performance; and performance itself often is affected by a host of context variables, such as sociodemographics, home support, and student attendance patterns, which are not readily amenable to education solutions alone.

Moreover, the research in this area—measuring the effects of teaching, and teacher learning, on student achievement—is in its infancy. Nonetheless, an accountability system must be created that has the reasonable prospect of linking federal professional development funds to improved student learning. Under this proposal, each state, to receive professional development funds, would designate how it plans to measure student achievement. States might choose to use NAEP results, or a state test aligned with that state’s standards, or a state test that includes some NAEP questions. Or states might use a combination of indicators—test scores plus portfolios of student work, for example.³¹

Not all states will choose the same indicators, but all states will select some performance indicators. Measurements of progress or achievement ought to be those already in play, or soon to be in play, as part of the state’s own learning improvement plan.

Student achievement needs to be at the heart of states’ accountability systems, but accountability should not become another federally imposed state burden. Accountability needs to be genuine, but the process ought to be a seamless component of states’ ongoing education improvement efforts and the results of those efforts.

Each state would regularly report student achievement in mathematics, science, and other state-designated subjects for which federal professional development funds are claimed. Should there be little or no demonstrable improvement in these areas, and should the state be able to offer no satisfactory explanation for this situation, then federal professional development funds would be at risk.

Federal professional development dollars would be converted to an “as long as” entitlement. As long as student achievement in designated subjects increases, the state would be entitled to receive funds. The success of professional development would be measured on the basis of student learning gains.

The suggested changes will not be easy to achieve. States and districts will need to pay considerable attention to developing appropriate indicators and to building state and local capacity to offer competent professional development. Right now, good professional development programs—whether offered by states, school districts, colleges and universities, or private providers—are few and far between. Increasing the capacity of states, districts, and teachers themselves to judge the quality of professional development offerings, to take advantage of those that

enhance teachers' subject matter knowledge and subject-based pedagogy and reject those that do not, will be essential.

Finally, accountability needs to be a two-way street. In addition to data the states submit, the federal government could conduct a periodic nationwide review of the ways in which its professional development dollars are being deployed. The government might select a random sample of states and school districts or select some number of states and districts that seem to be showing the greatest gains in student achievement. The purpose would be to chronicle what teacher professional development looks like in these places and then feed back to states information about promising practices. In this way, the states would be the beneficiaries of an added return on their accountability investment. These findings might also have the ancillary effect of helping to shape federal research and development priorities.

An Opportune Time

This paper began with the assertion that now is an opportune time to rethink federal professional development programs and priorities. A more focused approach that concentrates on increasing teachers' subject matter knowledge and subject-based pedagogy, and holds recipients of these federal dollars accountable for improving student learning, seems both sensible and worthwhile.

If the United States is truly serious about improving student achievement, then it must be equally serious about the ways in which resources are dedicated to this purpose. The federal government has a golden opportunity to demonstrate its commitment to ensuring that all students are given a real chance to achieve at the high levels for which policymakers have been so aggressively advocating. Rethinking the way in which federal professional development dollars are apportioned is a good place to begin.

Comment by Thomas Toch

Julia E. Koppich has framed the teacher training issue correctly: Students cannot be expected to master today's higher standards without having teachers capable of teaching the higher standards. It is that simple.

Koppich also draws attention to the biggest flaw in the federal response to the standards movement—the superficiality of too many Eisenhower-funded programs. More than half of all Eisenhower-sponsored training lasts one day or less. Inevitably, training of such duration tends to have little lasting influence.

To counter such superficiality, a problem that is endemic in teacher professional development, I would argue for the sorts of intensive summer institutes that flourished under the National Defense Education Act of 1958, intensive programs that had a sanguine effect on the quality of math and science instruction in the late 1950s and early 1960s.

Furthermore, improving instruction in reading in the elementary grades should be a high priority of the Eisenhower program. I do not take issue with Koppich regarding the importance of subject matter content in staff development. But many elementary school teachers do not know how to teach reading well, even though learning how to read is the cornerstone of elementary education and thus the most important thing that goes on in elementary classrooms. Considerable energy must be put into that fundamental building block of K-12 education.

There is also a larger reality regarding the Eisenhower program. Vast amounts of professional development monies—monies not counted as such—are being frittered away through the single salary schedule. That salary system, pervasive in public education, awards salary increases strictly on the basis of years of experience and college credits beyond the initial degree required for certification. Some 100,000 masters degrees are issued in education each year, most of them to classroom teachers. If those teachers receive a modest \$3,000 a year raise for earning their degrees, the cost to taxpayers is about \$300 million—or almost as much as the annual congressional appropriation for the Eisenhower program.

The money is not well spent. Nearly half the courses that teachers take on their way to their masters degrees are about school administration, which has nothing to do with what is going on in their classrooms. So, by and large, that money is wasted as a professional development resource. To address this structural problem in public education, Congress could offer financial incentives to several states to uncouple the salary increases from college course credits and link them, instead, to intensive summer institutes.

Congress should also consider expanding the scope of the Eisenhower program to include other teacher-quality initiatives, such as, for exam-

ple, signing bonuses to encourage teachers to work in hard-to-staff schools. Congress already has embraced the incentive notion by permitting states to spend up to 5 percent of their Eisenhower monies on financial incentives for teachers to obtain advance licensing through the National Board for Professional Teaching Standards.

Another model is the Yale-New Haven Teacher Institute, which has been around for two decades. It brings together New Haven public school teachers with senior Yale faculty in semester-long seminars. The topics of the seminars are proposed by the New Haven public school teachers. The collaborations culminate in curriculum units that are widely used in the New Haven public school system. Another significant payoff of the program is that it has reduced teacher attrition in New Haven. Teacher attrition rates and the consequences of professional development on those rates are an additional way to evaluate the effectiveness of professional development programs, including the Eisenhower program.

As Koppich points out, Congress has sought and largely failed to measure the payoff of the Eisenhower program. Drawing trustworthy cause-and-effect relationships between a teacher training initiative and a state standardized basic skills test scores is, to put it mildly, an inexact science. Many factors influence student achievement. Drawing a straight line from a particular training program to a test score is very difficult. Greater accountability in schools is a primary goal, but basic skills test scores should not be used in ways that are indefensible.

If Congress wants to know whether it is getting its money's worth in the Eisenhower program, it should fund studies that seek to isolate the influence of intensive professional development on student achievement. It should do the same sorts of studies on trends in teacher attrition and other indicators. In the absence of positive results from such studies, Koppich's notion of requiring states to demonstrate achievement gains as a condition for receiving future Eisenhower funding may be premature.

Pennsylvania uses another way of evaluating professional development. It measures the results of Eisenhower-funded programs not on the basis of student achievement, but by the extent to which the programs improve teachers' grasp of their subjects. It tests teachers before and after they enroll in Eisenhower programs, then bases a portion of future program funding on the results. That seems to be a defensible method of accountability.

Koppich's thoughtful discussion of the Eisenhower experience in California suggests that the movement to raise standards in the nation can be a catalyst to the improvement of teacher staff development. California districts, as Koppich points out, have spent many of their Eisenhower dollars ensuring that teachers have mastered the state's new, more rigorous math and science instructional frameworks. Rigorous state curriculum standards, it seems, give badly needed pedagogical direction to local schools.

Comment by Michael Podgursky

The federal government currently spends roughly \$350 million on Title II Eisenhower programs, which provide subsidies for teacher professional development. Julia E. Koppich proposes to increase this spending to at least \$800 million annually based upon her belief that a research-based consensus about "what works" has emerged. In these comments I make two points. First, little evidence exists that spending on professional development raises student test scores. Second, even if the research did show such a relationship, allowing school administrators to decide how to spend their budgets is probably better than using federal categorical programs to regulate spending.

Quality of the Research

Part of Koppich's case for expanded federal expenditures rests on an extraordinary claim: "Teacher qualifications . . . account for 50 to 90 percent of the variation in student achievement." Were this true, it would certainly make a prima facie case for larger expenditures on teacher training. Even if only a small fraction of professional development dollars were spent wisely, the returns in terms of student performance would be very large. However, I am aware of no reliable study of individual student achievement that supports such a claim. In general, the education production function studies conclude that teachers matter, but they do not explain half the variation in student test scores, and it is difficult to pin down what it is about teachers (at least what can be measured in surveys) that matters.³²

The two studies cited by Koppich certainly do not support such a strong claim for teacher qualifications. Ronald Ferguson's widely cited study of Texas school districts did find that teacher scores on a test of verbal ability were associated with higher student test scores, after controlling for other district-level characteristics. The combined explanatory power of all the regressors in his models, including numerous controls for socioeconomic characteristics, approached 50 percent of interdistrict variation. However, even if he had found that teacher characteristics alone explained 50 percent of interdistrict variation, that says virtually nothing about explained variation in individual student test scores. The reason is that more than 90 percent of variation of student test scores occurs within school districts.³³ All of this intradistrict variation is averaged away in Ferguson's data. The second study cited, by Parmalee P. Hawk, Charles R. Coble, and Melvin Swanson, compares the general math and algebra scores of students taught by eighteen math-certified and eighteen non-math-certified (that is, out-of-field) teachers in several North Carolina schools. No regression results were reported in this study; the authors simply compared mean test scores between the two groups of students. However, if a simple analysis of variance decomposition is computed based on the statistics reported in the article, teacher math certification explained just 3.6 percent of the variation in student test scores in general mathematics, and less than 1 percent of the variation in student algebra scores.³⁴

Koppich then argues that a body of research supports a consensus about what works in teacher professional development. However, the studies that Koppich cites do not provide strong evidence in support of the hypothesis that expenditures on professional development raise student test scores. She cites claims that a case study of New York City's Community District 2 shows that professional development "has been shown to improve teacher practice in ways that contribute to improved student achievement." This case study by Richard F. Elmore, relying on interviews and site visits, describes a variety of factors that Koppich believes have contributed to the test score gains. Yet a descriptive case study of a single school district, while suggestive, cannot be considered strong causal evidence. Many variables changed during the period under consideration, making it difficult to isolate the specific contribution of professional development *per se*. Moreover, some of the proposed expla-

nations (for example, “oversight and principal site visits”) have nothing to do with professional development as traditionally defined.

Koppich claims that a study by David K. Cohen and Heather C. Hill of California schools shows that ongoing professional development centered on concepts teachers are required to teach raises student test scores. This study does report evidence of a positive relationship between school-level mathematics test scores on the California Learning Assessment System (CLAS) and teacher opportunities to learn (OTL) about the assessment for a relatively small sample of California elementary schools.³⁵ However, even if the limitations of the authors’ data are ignored and a causal interpretation is accepted, it is not clear how widely such results will generalize. CLAS was a new, and rather unusual, type of open-ended mathematics assessment. When teachers were given the opportunity to learn about it, their students did better. The question of whether professional development gains would have persisted over time as students and teachers became more familiar with the test is not answered. Moreover, the majority of teachers in the Cohen and Hill sample who were given an opportunity to learn about the test apparently did so in the type of short, one-shot workshops that Koppich criticizes, instead of the “continuous, sustained, and cumulative” programs she favors. Koppich cites a second study of CLAS test scores by David Wiley and Bokhee Yoon, which finds some associations between measures of teacher OTL and student performance. However, these were simple differences in means, without controls for the socioeconomic status of students. Wiley and Yoon therefore present their findings with a caveat that undermines Koppich’s thesis: “When one compares OTL and student performance, one does not find a causal relationship because of several complicating factors. Many factors—including home environment and socioeconomic status—have equal or greater impact on student performance than the quality of schools (e.g., OTL).”³⁶

Title II funding has also been provided to the National Board for Professional Teaching Standards to develop programs for identifying “accomplished teachers” on the basis of portfolios, self-prepared videotapes, and other open-ended assessments. The National Commission on Teaching and America’s Future has proposed that 105,000 teachers be certified over the next several years. The Clinton administration endorses this goal as well. Yet no evidence is available to date that the students of teachers who pass National Board certification learn more than those who do not.

In short, I do not believe that there exists a strong body of research demonstrating that Title II–type professional development programs produce improvements in student performance.

Are Subsidies Justified?

Even if there were a large body of research showing that expenditures on teacher professional development raise student test scores, that does not in itself explain why a categorical federal program is needed to subsidize it. School administrators must make decisions as to how to allocate their spending to meet their educational performance objectives. To justify federal categorical aid, some compelling argument should be made that, left on their own, with the information at their disposal, schools underinvest in professional development as compared with other productive expenditures.

Consider an agricultural analogy. Many inputs will increase farm productivity: fertilizer, improved seed, mechanization, irrigation, better training for farm managers, and so forth. Suppose that a body of research demonstrates that a new type of fertilizer improves yield. Should the federal government subsidize the use of this farm fertilizer? Isn't it sufficient to simply publicize the findings and let farmers act accordingly? The case for a subsidy rests on identifying a "market failure," that is, some systematic reason that farmers are underinvesting in fertilizer as compared with other inputs.

I do not know the optimal level of expenditures on professional development. Clearly, proponents of Title II-type programs believe that schools are not spending enough on it. The National Commission on Teaching and America's Future proposes that 1 percent of state and local outlays should be spent on such programs (plus matching federal grants), for a total of \$2.75 billion in 1996 dollars, but it offers no evidence that this expenditure is the best use of these funds.³⁷ However, as with the farm analogy, proponents of subsidies need to explain why the federal government is in a better position to know the optimal mix of spending than a local school administrator. As compared with federal or state regulators, local school administrators have much better information about the most pressing needs in their schools. If they are held accountable for performance in the school, why shouldn't they decide on the level and composition of spending on professional development?

A 'Market Test'

Many states are attempting to increase accountability of public schools through the development of academic standards and assessments, expanded school choice, charter schools, and performance contracting. These efforts focus regulatory oversight where it ought to be—on educational outcomes. By contrast, Koppich's proposals continue past practices of focusing on school inputs. Not only is the record of such policies a poor one, but if measures to enhance school accountability are to succeed, constraints that prevent local administrators from using resources as they judge best also must be removed.

For example, currently, the Title II categorical program in effect tells schools: "Here is \$2,000, but you can spend it only on National Board certification for a teacher" (\$2,000 is the current per teacher fee charged by the National Board). A better approach would be to make such programs pass a "market test." Hold schools accountable and let them spend their budgets as they see fit. If National Board certification is worth \$2,000, then schools will buy it, just the way they buy textbooks, computer software, teaching modules, and other education inputs. If it is not, they will not. Why is a federal subsidy required? The same argument can be made for any other type of teacher professional development outlays.³⁸

Federal programs that provide aid to schools in the form of narrow, categorical assistance distort market prices and restrict how local administrators can allocate their budgets. In so doing, they undermine state-level efforts designed to increase accountability and efficiency in public K-12 education spending.

Notes

1. National Commission on Excellence in Education, *A Nation at Risk: The Imperative for Educational Reform* (Government Printing Office, 1983).

2. Activities for foreign language and computer educators were also funded under Title II, but the majority of the dollars was spent for mathematics and science.

3. Title II Eisenhower consists of three component parts. Part A is composed of federal activities (currently the National Eisenhower Clearinghouse and support for the National Board for Professional Teaching Standard's continuing research and development). Part B is the state share. Part C is money for federal demonstration projects of promising practices. This paper focuses only on Part B.

4. National Commission on Excellence in Education, *A Nation at Risk*, p. 22.

5. James B. Stedman, *Eisenhower Professional Development Program: Moving beyond Math and Science* (Congressional Research Service, 1994).

6. Michael Knapp and others, *The Eisenhower Program and the Reform of Mathematics and Science Education: A Necessary But Not Sufficient Resource*, National Study of the EESA Title II Eisenhower Program, prepared under contract to the Department of Education (Menlo Park, Calif., and Washington: SRI International and Policy Studies Associates, 1991).

7. National Commission on Teaching and America's Future, *What Matters Most: Teaching for America's Future* (Columbia University, Teachers College, 1996).

8. Catalog of Federal Domestic Assistance, found at aspe.os.dhhs.gov/cfda/p.841.htm/2/24/99.

9. As a result of the 1997 U.S. Supreme Court decision in *Agostini v. Felton* (521 U.S. 203), federal dollars, under some circumstances, can support activities involving private school students and their teachers.

10. Information for this section is taken from two sources: Carin A. Celebuski and others, *Dwight D. Eisenhower Professional Development Program: Analysis of Data from the 1996–97 Annual Performance Reports*, draft version (Washington: Westat, 1999); and Beatrice F. Birman, Allison L. Reeve, and Cheryl Sattler, *The Eisenhower Professional Development Program: Emerging Themes from Six Districts*, prepared for the Department of Education (Washington: American Institutes of Research, 1998).

11. Peter Schrag, *Paradise Lost: California's Experience, America's Future* (University of California Press, 1998).

12. Between 1994 and 1998, California suspended its statewide student testing program. In 1998 the state began to offer a still-developing statewide test consisting of the Stanford 9 achievement exam with augmented questions keyed to California's standards.

13. Judith Warren Little and others, *Staff Development in California: Public and Personal Investments, Program Patterns, and Policy Choices* (San Francisco and Berkeley, Calif.: Far West Laboratory for Educational Research and Development and Policy Analysis for California Education, 1987).

14. Julia E. Koppich and others, *The Eisenhower Mathematics and Science Education Program* (Berkeley, Calif.: Policy Analysis for California Education, 1993).

15. See Ronald Ferguson, "Paying for Education: New Evidence on How and Why Money Matters," *Harvard Journal of Legislation*, vol. 28 (Summer 1991), pp. 465–98; and P. Hawk, C. R. Coble, and M. Swanson, "Certification: It Does Matter," *Journal of Teacher Education*, vol. 36 (1985), pp. 13–15.

16. For a more complete treatment of the relevant research, see Julia E. Koppich and Michael S. Knapp, *Federal Research Investment and the Improvement of Teaching, 1980–1997*, paper prepared for the Department of Education, Office of Educational Research and Improvement (Seattle, Wash.: Center for the Study of Teaching and Policy, 1998).

17. See, for example, Linda Darling-Hammond and Deborah Ball, *Teaching for High Standards: What Policy Makers Need to Know and Be Able to Do* (New York: National Commission on Teaching and America's Future, in cooperation with the Consortium for Policy Research in Education, 1997).

18. See Robin R. Henke and others, *America's Teachers: Profile of a Profession, 1993–94*, prepared by MPR Associates (Department of Education, Office of Educational Research and Improvement, 1997); and Laurie Lewis and others, *Teacher Quality: A Report on the Preparation and Qualifications of Public School Teachers* (Department of Education, Office of Educational Research and Improvement, 1999).

19. Richard Ingersoll, "The Problem of Underqualified Teachers in American Secondary Schools," *Educational Researcher*, vol. 28 (March 1999), pp. 26–37.

20. Unless otherwise specified, these data are taken from Ingersoll, "The Problems of Underqualified Teachers in American Secondary Schools."

21. Jeannie Oakes, *Multiplying Inequalities: The Effects of Race, Social Class, and Tracking on Opportunities to Learn Mathematics and Science* (Santa Monica, Calif.: RAND Corporation, 1990).

22. Lewis and others, *Teacher Quality*.

23. Henke and others, *America's Teachers*.

24. Lewis and others, *Teacher Quality*.

25. See, for example, Consortium for Policy Research in Education, *Policies and Programs for Professional Development of Teachers: A 50-State Profile* (Philadelphia, 1997).

26. Richard F. Elmore, *Investing in Teacher Learning: Staff Development and Instructional Improvement in Community School District #2, New York City* (New York: National Commission on Teaching and America's Future, in cooperation with the Consortium for Policy Research in Education, 1997).

27. See David K. Cohen and Heather C. Hill, *Instructional Policy and Classroom Performance: The Mathematics Reform in California* (Philadelphia: Consortium for Policy Research in Education, 1998).

28. In addition to Cohen and Hill, *Instructional Policy and Classroom Performance*, see Richard F. Elmore, *Investing in Teacher Learning: Staff Development and Instructional Improvement in Community School District #2* (New York: National Commission on Teaching and America's Future, 1998); and David Wiley and B. Yoon, "Teacher Reports of Opportunity to Learn: Analyses of the 1993 California Learning Assessment System," *Educational Evaluation and Policy Analysis*, vol. 17, no. 3 (1995), pp. 355–70.

29. There might be a few exceptions to the dollars in a single professional development law dedicated to subject matter and subject-based pedagogy. For example, professional development for special education teachers, particularly for teachers of severely handicapped children, may have a different, and legitimate, purpose.

30. For an explanation of the levels of evaluation of teacher professional development, see Thomas R. Guskey, "New Perspectives on Evaluating Professional Development," paper presented at the annual meeting of the American Educational Research Association, Montreal, Canada, April 1999.

31. Lining up student achievement tests with teacher professional development, and vice versa, may take some time. Thus, for a while—perhaps two years—states might be authorized to assess professional development on the basis of teacher learning. They might, for example, take a page from Pennsylvania's book and administer to teachers professional development pre- and post-tests designed to gauge acquired knowledge.

32. For example, see Dan D. Goldhaber and Dominic J. Brewer, "Why Don't Schools and Teachers Seem to Matter?: Assessing the Impact of Unobservables on Educational Productivity," *Journal of Human Resources*, vol. 32, no. 3 (Summer 1997), pp. 505–23. Using data from the NELS88, these authors regress tenth-grade math test scores on eighth-grade scores and an extensive set of controls for the socioeconomic characteristics of the student and his or her school. This yields an R^2 of 0.763. When they add a vector of twenty teacher characteristics and behaviors (for example, math major, certification in math, experience, uses National Council of Teachers of Mathematics methods) the R^2 rises only marginally to 0.768. In other words, after controlling for socioeconomic characteristics and a pretest, the independent contribution of teacher characteristics to explained variation is very small (0.5 percent). This does not mean that teacher characteristics do not matter;

some of the measured teacher characteristics were statistically significant. What it does show is that a substantial correlation exists between measured teacher characteristics and socioeconomic characteristics of students and schools. This is why it is not possible to uniquely partition explained variation into a part resulting from socioeconomic conditions and a part resulting from teachers or schools.

33. For example, a recent study by Steven C. Rivkin, Eric A. Hanushek, and John F. Kain, "Teachers, Schools, and Academic Achievement," Amherst College, 1998, finds that, in 1995, interschool variation in Texas explained just 5.5 and 3.3 percent of variation in Texas Assessment of Academic Skills (TAAS) grade school scores in mathematics and reading, respectively. Because school districts are simply aggregations of schools, these figures represent upper bounds on the share of total variation, which could be accounted for by interdistrict variation.

34. The National Commission on Teaching and America's Future has made similar assertions concerning the explanatory power of teacher credentials. National Commission on Teaching and America's Future, *Doing What Matters Most* (Columbia University, Teachers College, 1997). An extensive critique of these claims may be found in Dale Ballou and Michael Podgursky, "Reforming Teacher Preparation and Licensing: What Is the Evidence?," *Teachers College Record* (forthcoming 1999).

35. David K. Cohen and Heather C. Hill, in *Instructional Policy and Classroom Performance: The Mathematics Reform in California* (Philadelphia, Pa.: Consortium for Policy Research in Education, 1998), analyze fourth-grade mathematics test scores averaged at the school level for a sample of 162 public schools. It is a cross-section sample with one observation per school. The variables representing professional development and other conditions at the school were derived from a survey of teachers at the schools. However, only two to four teachers per school were surveyed in the estimation sample.

36. David Wiley and Bokhee Yoon, "Teacher Reports on Opportunity to Learn: Analyses of the 1993 California Learning Assessment System (CLAS)," *Education Evaluation and Policy Analysis*, vol. 17, no. 3 (Fall 1995), pp. 355–70.

37. National Commission on Teaching and America's Future, *Doing What Matters Most*, p. 121.

38. The recent teacher quality "manifesto" from the Fordham Foundation makes a good case for greater flexibility and less regulation of teacher labor markets. See Fordham Foundation, *The Teachers We Need and How to Get More of Them* (Washington, 1999). With respect to Title II spending, see John R. Phillips and Marci Kanstoroom, "Title II: Does Professional Development Work?," in Marci Kanstoroom and Chester E. Finn Jr., eds., *New Directions: Federal Education Policy in the Twenty-First Century* (Washington: Fordham Foundation, 1999).