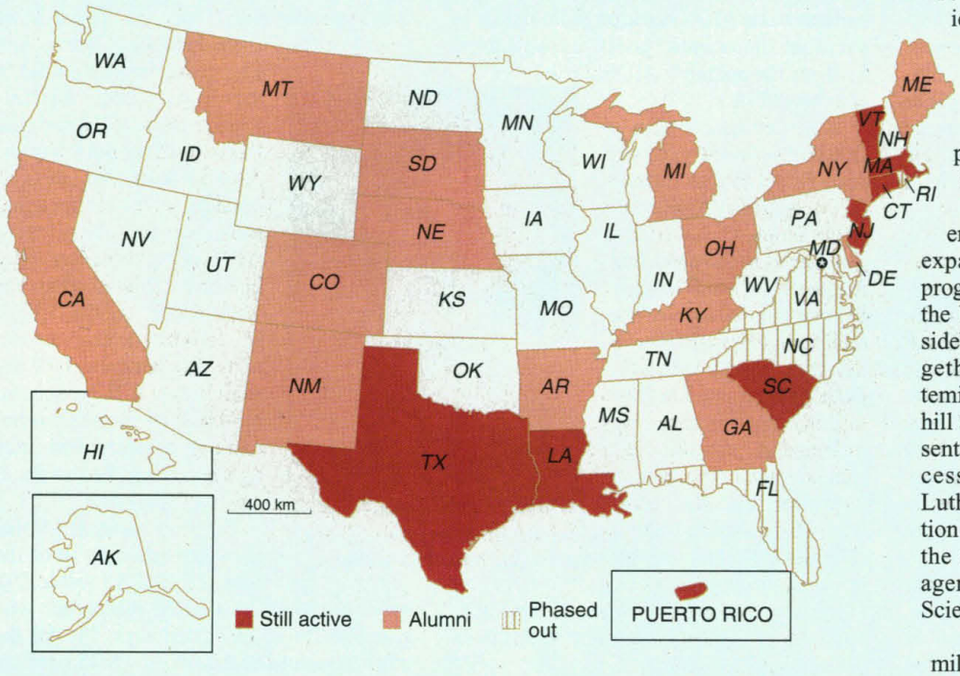
The Statewide Systemic Initiatives were supposed to transform how public schools taught science and math. But after 7 years, the National Science Foundation is still looking for answers

Mixed Grades for NSF's Bold Reform of Statewide Education

Buffalo's Southside School sits in a tough neighborhood of this aging industrial city in upstate New York. Each day its 1400 elementary and secondary school students make their way to school amid poverty and crime. However, for several years the students received some high-profile help from Washington as part of an unusual national effort to improve the dismal state of U.S. science and math education.

And although one might think that any help would be welcome in such a grim setting, a new principal who arrived in the program's fourth year shut down the project, saying that it was divisive, hadn't improved student performance, and wasn't a priority with higher-ups in the Buffalo school system (see sidebar on p. 1804).

The rise and fall of the Southside project, one of 12 demonstration schools across the state, reflects the harsh realities of education reform in science and math. The program that funded it, NSF's Statewide Systemic Initiatives (SSI), is a radical departure from the agency's traditional practice of funding individual educational projects involving a relative handful of teachers, students, and school districts. It's a bold attempt—perhaps the most ambitious in NSF's broad portfolio of education programs—to achieve reform on many fronts at the statewide level. From training teachers and developing new curricula to rewriting state laws and reshuffling school management, it strives to change entire education systems rather than just tinkering with their component parts. At the same time, it has retained an element common to most NSF programs—a bottoms-up approach that asks educators for their best ideas and doesn't assume the agency has all the answers.



Then there were eight. NSF has funded 26 Statewide Systemic Initiatives projects, with eight winning a second 5-year award and four being phased out early.

SOURCE: NSF

The SSI effort, launched in 1991 in 10 states, grew out of a bipartisan political promise to make U.S. elementary and secondary students the best in the world in science and math (see Policy Forum on p. 1830). By 1993, when New York joined the program, 25 states and Puerto Rico had been promised up to $10 million over 5 years to overhaul their science education systems. In 1994, NSF expanded its reach by creating sibling programs for large urban districts, called the Urban Systemic Initiatives (USI; see sidebar on p. 1802), and rural areas. Together, these initiatives crowned systemic reform as king of the educational hill at NSF. "This trilogy of efforts represents a singular strategy to achieve [success] for all of America's students," Luther Williams, head of NSF's education directorate and the chief architect of the systemic reform program, told the agency's governing body, the National Science Board, in a 1994 presentation.

But after 7 years, and nearly $600 million spent on the three programs, officials are still a long way from knowing whether systemic reform works—or even what constitutes success. A major assessment of the statewide efforts, a 5-year, $4.6 million evaluation by SRI International of Menlo Park, California, concluded this spring that the program's impact has been extremely hard to measure and that evidence of improved test scores as a direct result of the SSI reforms is even more tenuous (www.sri.com/policy/cehs/edpolicy.html). "The impacts of individual SSIs were positive but limited because no SSI was able to 'go to scale' and intensively affect all teachers statewide," the report states. "Also, the [project's] impact was almost always un-

even, affecting some districts, schools, teachers, or students much more than others." An outside evaluation of New York state's program, for example, concluded that after 4 years, only four of the 12 original demonstration schools like Southside "were poised to carry on with their reform efforts."

That spotty record doesn't surprise the scores of educators, state officials, policy analysts, and researchers interviewed for this article. Although $600 million is a large sum by NSF standards, it's a drop in the bucket of national education spending. Many believe that the mixed record also reflects mistakes by NSF, a relatively small and obscure federal agency, in launching a high-profile educational initiative without adequate preparation, a comprehensive management strategy, or a clear and consistent idea of how to evaluate its impact. "People knew, deep down, that doing a whole state was an impossible task," says Margaret Cozzens, who headed elementary and secondary programs at NSF for 7 years before leaving this summer to become vice chancellor for academic affairs at the University of Colorado, Denver. "But there was tremendous pressure to do something. So NSF got things started and then tried to figure out what works as it went along."

That experimental approach troubles some politicians familiar with the program. "As scientists, we dislike fuzzy thinking," said Representative Vern Ehlers (R–MI), a physicist turned politician, at a 23 July hearing on systemic reform before the House Science Committee. "And I feel that SSI did not, and perhaps still does not, have clearly defined objectives that the states understand and are trying to achieve." A state legislator who followed the Michigan SSI project before coming to Washington in 1995, Ehlers says he "liked the initial idea, but I'm concerned about whether the results have been worth what we have invested."

Despite sharing many of those misgivings, educators unanimously applaud NSF for launching the initiative. They think that the program, despite its flaws, has made a positive contribution to the national debate on how to improve science and math education. "I think that NSF is on the right track, and that even those states that have been canceled made a better use of the money than if it had gone to separate teacher enhancement programs or curriculum development," says Iris Weiss, president of Horizon Research Inc. of Chapel Hill, North Carolina, which has evaluated several state projects.

Many also believe that the SSI program has helped people at all levels—students, teachers, parents, public officials, and community leaders—even if the results aren't immediate and can't be measured easily. "I think every state has benefited," says Nancy Mincemoyer, head of the Michigan SSI project, which ended last year. "When we asked people in Michigan what the impact of the SSI had been, they said, 'It made us think. Nobody had asked us to think systemically

Puerto Rico Builds a Pyramid of Success

Ask educators for a success story from the National Science Foundation's (NSF's) Statewide Systemic Initiatives (SSI) program and most will point offshore, to Puerto Rico. There, teachers in target schools have been trained in a new curriculum and student test scores have risen—and the reforms are spreading outward from this solid base. Funded initially in 1992, the Puerto Rico program was renewed for another 5 years in 1997. "When we looked at who to renew, we wanted to find models of what can work, like in Puerto Rico," explains Luther Williams, head of the education directorate at NSF.

Puerto Rico's school system is highly centralized. It's also large: If it were one district, it would be among the three largest in the country, behind New York City and on a par with Los Angeles. The SSI project is directed by Manuel Gomez, a physicist and administrator at the University of Puerto Rico, who runs it as an experiment—including a testable hypothesis, controls, data collection, and constant monitoring. The heart of the reform is training teachers to work with a new, standards-based curriculum—the same kind of changes made in other SSI projects. But Gomez's management strategies put his program over the top, observers say. "Manuel has succeeded for a variety of reasons," says Shirley Malcom, a former member of NSF's oversight board and head of the education and human resources directorate at the American Association for the Advancement of Science (which publishes *Science*). "A big part is his insistence on doing things right."

As part of that rigor, Gomez has spent $1.2 million to compare students at SSI schools with their counterparts at other public schools and at the island's extensive system of private schools, using publicly available portions of national and international assessments translated into Spanish. In addition, every SSI student is tested each fall and spring to help assess their progress. Puerto Rico has also made its SSI project the hub for other state and federally supported efforts to improve science and math education.

Gomez's major innovation has been to employ a pyramid system based on bringing systemic reform to one school at a time. He began with 6 weeks' summer training of teachers from seven middle schools. Next, Gomez converted the pilot schools into what he calls "dissemination centers" to train the next round of teachers. The following summer each center worked with teachers from eight to 10 schools; the most successful seven buildings became a second tier of dissemination centers. Eventually the project brought standards-based curricula into elementary schools and then into high schools. By this fall it had reached 400 schools, one-quarter of the island's total, and project officials expect to double that number in the next 2 to 3 years.

A solid foundation. These Puerto Rican students construct a river as part of a lesson in earth sciences.

CREDIT: RICARDO ALCARÁS/PR-SSI

"Everybody said it was a clumsy idea because it takes so long," says Gomez. "But I said, 'Be patient. It will work if we give it time.' " Getting all the teachers on board at a school is another key element, he adds. "I could train five teachers and call it an SSI school," he says. "But if the teacher next door feels threatened, then he or she will go to the principal and try to get it squashed."

Such intelligent management strategies have paid off. In its evaluation report, SRI International of Menlo Park, California, singled out Puerto Rico as one of four states "with the most credible evidence" that the SSI project had raised student achievement. Gomez's approach is also beginning to spread beyond the island. This fall NSF gave the project a 3-year, $750,000 award to adapt the model to New York City's Urban Systemic Initiative, which hopes to use Puerto Rico's Spanish-language material in setting up its own dissemination centers. "We see it as an important step in applying what we've learned," says the University of Puerto Rico's Norma D'Avila, co-director of the project. **–J.D.M.**

Urban Districts Grab the Spotlight

The sprawling Statewide Systemic Initiatives (SSI) were the National Science Foundation's (NSF's) first efforts at systemic education reform. But that program, begun in 1991, is no longer the agency's flagship educational effort. That honor now belongs to the Urban Systemic Initiatives (USI) program, launched 3 years later, which targets the 25 cities with the largest number of poor children in the country.

Many educators say the urban initiatives have a big advantage over NSF's statewide programs. City schools are usually run by a single administrator or school board—a definite advantage when you're trying to cut through layers of bureaucracy and overturn the status quo. State systemic efforts, in contrast, must negotiate among several, often competing, sources of power. "I think that NSF's approach is better suited to a smaller administrative unit, like a city," says Tom Baird of the Florida Department of Education and former director of the Florida SSI, which was terminated 6 months early.

Helping big cities, where the problems are seen as more urgent and the stakes even higher, is also politically sexier. "Congress wants to have more of them, and they certainly demonstrate NSF's commitment to working with the population in greatest need," says Margaret Cozzens, a former senior NSF education official now at the University of Colorado, Denver.

URBAN SYSTEMIC INITIATIVES

1994	1995	1996
Baltimore	Cleveland	Milwaukee
Chicago	Columbus	San Antonio
Cincinnati*	Dallas	San Diego
Detroit	Fresno	St. Louis
El Paso	Los Angeles	
Miami	Memphis	**1998**
New York City	New Orleans	Atlanta
Phoenix	Philadelphia	Jacksonville

*Phased out.

The USI program gives each site up to $3 million a year for 5 years, 50% more than SSI states receive, to support a similar mix of efforts to reform the district's entire science and math education program. Although many USI cities are located in SSI states, the two projects are managed separately and often have little more than a nodding acquaintance with one other.

All told, 22 cities have been awarded grants since the program began. The sole casualty to date is Cincinnati, Ohio, which was terminated 1 year early after NSF officials decided that systemic reform had become lost amid a broader restructuring of the district. NSF officials also pulled the plug after 2 years on a similar systemic reform grant to the District of Columbia, which is not eligible for the USI program.

One problem that has plagued the SSI program—a shortage of data on student achievement—hasn't been a stumbling block for USI sites. Because most urban districts perform so poorly, city officials have typically regarded rising test scores as the litmus test for any educational reform and, thus, have invested heavily in preparing teachers and students for such achievement tests. As a result, several cities have managed to show improvement across one or more grades in specific subjects. But the challenge for USI sites has been to show a direct connection between higher scores and NSF's investment.

NSF officials sidestepped that issue in a 50-page booklet published in September that touts the accomplishments of the USI sites. It notes, for example, that Chicago elementary school students did better (by some unspecified percentage) on standardized tests in mathematics in the first year (1994–95) of the USI program. But a later table on middle school student achievement shows that the magnitude of gains shrunk after the first year and that sixth graders in non-USI schools actually did better than their USI counterparts over a 3-year period. The booklet also notes that Chicago high schoolers began to do better in math after the introduction of reforms that go beyond the USI project, including accountability measures—in effect, no more social promotion—and an end to substandard and remedial courses like "consumer math."

Although such improvement is welcome, Chicago Public Schools CEO Paul Vallas says that the discipline-based USI reforms are only part of the reason. What makes a bigger difference in raising student achievement, Vallas told an NSF-sponsored field hearing this summer on systemic reform in his city, are efforts such as an expanded summer school, early child care, and before- and after-school activities. "The bottom line," says Vallas, "is if you reach children earlier, if you keep them in school longer during the day and throughout the year, and if you provide them more instructional time, the children are going to perform better."

Whether or not the USI projects have been the catalyst for such changes, as NSF officials insist, their time may also be passing. Although Boston, Houston, and Indianapolis are still in the running for a first-time USI award, next spring marks the end of the line for seven cities in the first cohort, and NSF officials say they have not yet decided whether to fund a second round. Last month in Washington, Luther Williams, head of NSF's education directorate, reminded USI project directors that the two newest sites had first call on NSF's resources. He also encouraged cities to look for nonfederal partners, including industry, for continued support for their reform efforts. **–J.D.M.**

before.' It's a big science experiment, and NSF should be commended for sticking its neck out."

In the beginning

Nobody said it would be easy to improve U.S. math and science education in the public schools. But NSF seemed well placed to take on the challenge. It already was giving researchers millions of dollars a year to develop new materials, to improve the preparation and continued training of teachers, and to study how children learn. The problem, NSF officials acknowledged, was that those efforts were piecemeal and not linked to a larger reform strategy.

"There had actually been a 'reverse systemic' reform effort over the past 30 years, with a proliferation of separate projects," says ex–NSF staffer Joseph Danek, who helped create the education directorate's Office of Systemic Reform in 1991 and who headed it until he retired from government in 1994. The variety may have addressed specific problems in individual communities, Danek says, but it diverted attention and resources from the goal of improving student achievement nationwide. In 1989, at a historic education summit, President George Bush and the nation's 50 governors confronted that goal by announcing their commitment to making U.S. students the best in math and science by the end of the millennium. Meeting that promise, they knew, would require changing the entire education system.

The SSI program was NSF's response. At a May 1991 press conference held jointly with the National Governors' Association, Williams announced the first batch of SSI awards. The money was combined with funds from other sources that typically exceeded NSF's contribution, and in many cases it was also linked to existing local, state, and other federal initiatives—including some from NSF—that addressed specific concerns. "We recognized that the system itself was deficient," Williams explains, "and we asked what NSF could do to en-

SOURCE: NSF

hance that infrastructure. We can improve training for teachers, for example, but if they can't implement what they've learned it doesn't help."

The decade has seen many efforts to overhaul science and math education from kindergarten through grade 12. But none has taken quite the sweeping, state-by-state approach that NSF has followed. Even so, NSF's status as a federal agency imposed certain limitations. From certifying teachers and approving curricula to setting the length of the school day and year, the nation's educational system is largely a responsibility of the state, not the federal, government. And the dollars reflect that balance of power: Despite all the federal programs, Washington provides only 6% of the approximately $400 billion spent each year on K-12 education in the United States.

Recognizing that education rests firmly in the hands of local and state officials, NSF chose not to try to impose its vision of reform but rather allowed states to take the lead. "At the beginning we permitted them to do almost anything, as long as it was systemic," Williams says. "The idea was for NSF to help states reform their systems and then pull out, letting them continue on their own." The approach meant that NSF and the states were making up the rules on systemic reform as they went along. "We spent the first couple of years trying to figure out what to do," admits Frank Watson, a longtime faculty member at the University of Vermont who this summer stepped down as executive director of the Vermont SSI project.

The result was a bewildering array of projects that explored the universe of education reform. Montana wrote a new high school mathematics curriculum, while Vermont tackled its state policy-making apparatus as part of a broader campaign that resulted in a new funding formula. In California, a new administration jettisoned existing policies and practices and, combined with new rules on classroom size that swelled teacher ranks, plunged into an ongoing debate about what children should be taught. Some states, including New York and Puerto Rico, began their reform efforts in a handful of model schools and then tried to replicate their experiences on a statewide basis, with mixed success (see sidebars on pp. 1801 and 1804). Others, such as Connecticut and Maine, set up shop outside the regular bureaucracy and tailored their input to the needs of local districts.

Increasing the number of years of math and science required for high school graduation, eliminating remedial courses, writing new textbooks, training teachers to use "hands-on" lessons rather than lectures, and drawing up new tests to measure progress—all were part of the new equation in many states. So too were Saturday academies, science fairs, family math, and other community-based activities. The goal, to get everybody involved in changing the system and improving student performance, was the same. But the approaches were strikingly different.

A management headache

As this multifaceted effort gathered force, NSF struggled with how to administer it. "NSF had a good idea, but it isn't God," says Richard Cole, head of the Connecticut Academy for Education, which administers the state's SSI project, now halfway through its second 5-year award. "There were a lot of things that it wanted to accomplish, but it hadn't worked out the details."

Managing systemic reform is a challenge under the best of circumstances. "It's taken us 3 years to get them to understand what we are doing," says a project director whose state competed successfully for a second round of funding. And the situation at NSF was far from ideal. State officials and educators say the agency dug a hole for itself from the start by making multimillion-dollar awards based solely on paper descriptions of what states hoped to accomplish. "In retrospect, it's clear that the states needed a planning year to try out some ideas before they entered the limelight," says Weiss. Williams agrees. "One of the lessons we learned [for the USIs] is that we didn't want to do what we had done with the SSIs," he says. "So we funded the USIs to do a year of planning, at $150,000, to understand how to do systemic reform."

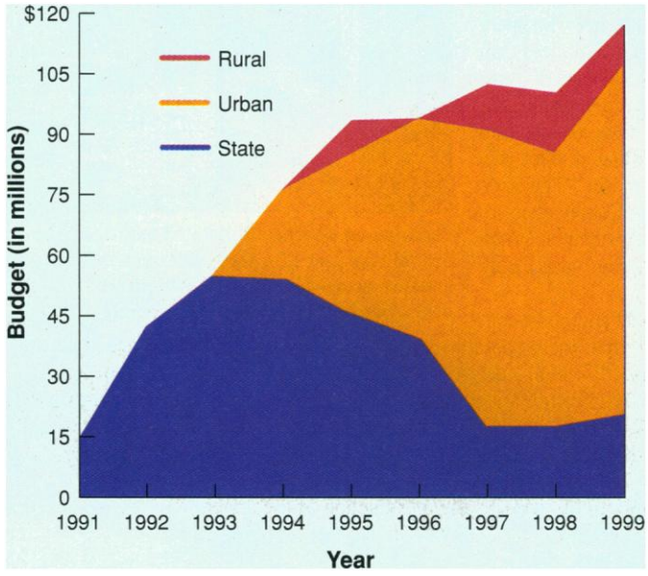
The effort also suffered from heavy staff turnover. Some state programs were managed by as many as half a dozen NSF program officers during their 5 years of funding. "We had three, one of whom was good, during our 5 years," says one state project director who requested anonymity. Adding to the instability was the departure in the fall of 1996 of Danek's successor as head of the systemic reform office, Peirce Hammond. (Hammond, who says he stepped down voluntarily, now works on similar issues at the U.S. Department of Education.) For the past 2 years Williams has personally handled the job along with his other duties, although this fall NSF finally advertised the position.

Assessing the inaccessible

Even before the program began, NSF officials say they recognized the need for close oversight and assessment of the effort. But trying to determine which programs were working proved to be a bigger problem than anyone imagined.

In the first few years, NSF was content to let states describe what they were doing and what they hoped to accomplish. Their voluminous annual reports contained plenty of descriptive information but little about short-term impacts on student achievement. "Our plan was to show results with the class that entered school in 1991 and graduated in 2003," says Cole. "We said from the start that we were in it for the long haul." With projects using different assessment strategies to measure different activities, even comparisons among states were difficult. "The system was created in such a way that we couldn't tell whether a project was working," says Weiss.

However, the demand for greater accountability grew over time. NSF began to insist that states show quantifiable progress in student achievement in their annual reports. In 1995, for example, it sent out a directive that contained nearly 100 pages of questions about activities in the past year, including requests for reams of data on course enrollments and test scores. The new reporting requirements sent state officials and evaluators into a tizzy, as much of the data either had never been assembled or didn't exist. "It was a huge effort—we were frantic to fill in all the boxes," says Charles Bruckerhoff of Curriculum, Research &



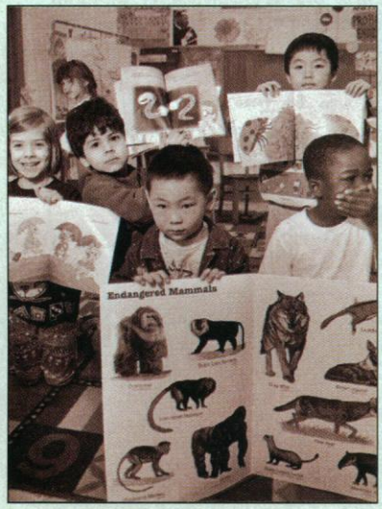
Sharing the wealth. Urban districts now far outpace states in the competition for a share of NSF's systemic reform dollars.

SOURCE: NSF

In New York, the Pieces Didn't Add Up

When New York applied to the National Science Foundation's Statewide Systemic Initiatives (SSI) program in 1993, its strategy was to start with the toughest schools—in economically depressed, high-minority, inner city areas—and then build up from there. Buffalo's Southside School certainly fit the bill (see main text). But the rush to begin—Principal Ray Cooley recalls having less than a month to scramble to put together a proposal that would supplement some instructional changes he was already making—was a taste of the organizational problems that would plague the project throughout its 5-year existence.

Cooley admits that systemic reform got off to a "rocky start" at Southside and that some veteran teachers were less than excited by the prospect of change. "I call it the year of the divorce, the year of tears," says district coordinator Kathy Resutek, a former teacher who spent most of her time in the building. Still, less than 2 years into the program, state officials were pointing to a new approach to learning, including hands-on activities such as labs and field trips, that was transforming student attitudes toward science and math. "The kids loved coming to school," says Cooley, who retired in 1997 after 18 years as principal. When he left, Cooley says, the program "was ready to take off."



Endangered species. Buffalo's Southside School was part of a statewide systemic initiative now ended that also included students *(above)* from P.S. 16 in Albany, N.Y.

But such changes in attitude and classroom behavior didn't translate into what many would consider success—improved student test scores. "We held our own in math, but we didn't do as well as I would have liked in science," says Cooley. And his successor, Marilyn Brock, also a veteran administrator, says she wasn't impressed with what she found. "I asked to see the original proposal and the results to date, but there was no documentation of anything," she says. "I had nothing to go on—I wasn't told anything about the project [by Buffalo school administrators] before I came here. I wasn't opposed to it, but there just didn't seem to be much interest [from downtown]—after all, the money was just a drop in the bucket compared to the district's overall budget." Brock also says the project was divisive, embraced by certain teachers in certain grades but not by the faculty as a whole.

Several Southside teachers who enthusiastically back the project dispute Brock's description. They say she saw the heavy use of teacher-led committees and other decentralized activities as a threat to her authority. Brock calls that accusation "one of many false rumors that was spread as soon as I arrived."

Sam Alessi, Buffalo's assistant superintendent for curriculum, believes poor communication was a major factor in the project's demise. Southside was "a very strong community, a family," he says, and "Brock was seen as an outsider. She wanted a pause, to be brought up to speed, and they saw it as opposition. I don't think she planned to stop it."

Both Brock and her critics agree on one point, however: Once she raised questions about the project, neither the district nor the state tried very hard to put it back on track at Southside. Alessi says the state already had plans to put most of the SSI money for 1997–98 into other schools and that systemic reform is continuing with other funds. But he admits that reforming one school, much less scaling up throughout the district and state, is a slow and difficult process at best. "Systemic reform isn't something that you can do overnight," he says about the extended effort—and mixed results—at Southside. "It takes years of discussions. That's why state systemic reform is so hard to do." **–J.D.M.**

Evaluation in Chaplin, Connecticut, who has evaluated Connecticut's SSI project.

After much grumbling from state directors, Williams set aside the directive and in 1996, with the program in its fifth year, issued what he calls the six "drivers" behind systemic reform (see table on p. 1805). The first four describe what reform efforts should look like and who should be involved. The last two address student achievement, ranging from better test scores to more science majors in college, with a special emphasis on the performance of underrepresented groups, in particular Hispanics and African Americans.

The drivers have become Williams's shorthand for describing what systemic reform is trying to accomplish and how to measure it. Although they didn't compel states to act in a certain way, the drivers imposed greater uniformity on how states reported what they had done. And project officials generally give NSF high marks for adopting such a management tool. "It was the first time I felt our work was being taken seriously," says one project director about the state's initial review following introduction of the drivers. "We got direct feedback that was very useful."

Unnatural selection?

Even before it had fully developed its assessment criteria, however, NSF made some tough decisions on which programs it would continue to support. The agency had funded the SSI program through a novel mechanism called a cooperative agreement, which allowed it to demand that states set annual goals and update them each year, with a penalty if they fell short. In addition, NSF used midterm reviews to let each state know how it was doing. Although many officials and educators felt that NSF kept changing the rules, agency officials saw the decisions to terminate some projects as proof of their fiscal prudence. Rhode Island, part of the first class of 10 SSI states, was booted out of the program in 1994 after a sharply critical midyear review. NSF officials felt that the program was never embraced by state officials nor firmly rooted in the schools. Over the next 2 years NSF cut off funding to three more states—North Carolina, Florida, and Virginia—before their scheduled 5-year run had ended. In the case of North Carolina, NSF's decision followed a report on the state's math and science instruction by a group of civic leaders who concluded that too many cooks were spoiling the educational broth.

Because the program had been phased in over 3 years, NSF found itself pulling the plug on some states at the same time it was receiving applications for a second round of support from others. Educators hoped that those new funding decisions would provide a clearer picture of what NSF expected from systemic reform efforts. But they say NSF officials continued to send mixed signals about which projects were doing well. NSF has never spelled out its selection criteria beyond saying that the proposals were judged on quality and in accord with its usual peer-review practices.

For example, several state officials have pointed to Colorado and Michigan as supposed models that, at some point, fell out of NSF's favor and lost in the second-round competition. Mincemoyer of Michigan says that "at past meetings we had been high-

CREDIT: JOE SCHUYLER

lighted as a successful SSI, but we never got much feedback from NSF when it turned down our proposal."

Vermont, which made the cut, has only recently put in place a statewide assessment and, therefore, had no student achievement scores, much less gains, to publicize. "It was a very big problem for NSF at first," confesses Watson. "But Vermont had never had a state assessment in math and science, and it took state officials a long time to recognize the need for one." NSF officials say the decision to fund Vermont for a second time was based on the assumption that the new assessment would give the state a chance to reap the fruits of systemic reform efforts that had been planted over the first 5 years.

At the same time, however, two of the four states that SRI identified as showing gains in the classroom—Montana and Ohio—failed to win new funds. Ohio's project, which provided a relatively small number of teachers with intense and ongoing training, was seen as "deep but narrow." And by focusing almost exclusively on high school mathematics, the Montana project was seen as insufficiently systemic, although it produced a much-admired curriculum.

To date, no state has succeeded in scaling up fully—going from a relatively small number of initial schools, teachers, and students to a statewide program. Although Williams says he would welcome a "how-to kit"—"I'd like a few states to stay in business long enough to be a fully reformed system and to write a paper for us on what they did," he says—most educators and evaluators say that they can't even imagine what such a manual would look like, much less that it could be written. "Statewide systemic reform is not a phenomenon; it's 26 phenomena," says Hammond.

Show me the data

In late October officials from the remaining eight SSI states gathered in a Washington suburban hotel with their systemic reform peers from urban and rural districts for an annual meeting to review their progress and to look ahead. Although their numbers—and the agency's investment in their efforts—have dwindled, state officials were reminded that the pressure to show results is as strong as ever. "In my 8 years at NSF, and 2 years as director [of systemic reform programs], I don't recall any time when we have been subjected to such sustained and challenging scrutiny," Williams told them. "The pressure is coming from everywhere—Congress, the White House, the scientific community, the science board, and NSF's own leadership. And it's all about the need for agencies to show successful outcomes."

However, few states have data showing sustained and significant payoffs in the classroom that are tied to SSI reforms. At best, concludes the SRI report, half of the 22 SSI states that completed at least 5 years showed "credible evidence" of fostering better practices by teachers using an improved curriculum. Only four states—fewer that one in six—could point to better test scores flowing from their SSI activities. And in two cases the sample size was tiny—no more than a dozen classrooms with a few hundred students. The rest, the report said, were engaged in activities that did not translate directly into better test scores—for instance, new standards for a statewide curriculum, or new rules on how state funds should be distributed.

> **"The pressure is coming from everywhere. ... And it's all about the need for agencies to show successful outcomes."**
>
> —NSF's Luther Williams

The SRI evaluators are careful to point out that "a change in student outcomes was only one target for the SSI program." But even discounting for other goals, as well as for tests not attuned to the new skills that the students have acquired, the evaluators conclude that "it seems likely that the SSI's impacts on student achievement were limited."

That message wasn't a surprise to many educators, who say it's unrealistic to expect even the best SSI projects to show great leaps in test scores given the program's relatively short life, the enormous challenges it addresses, and the insignificance of a $2-million-a-year program alongside a state's multibillion-dollar education budget. "You'd like to show remarkable results after 3 or 4 years, but frankly, that's impossible," says Sandy Scofield of the University of Nebraska, Lincoln, former director of the Nebraska SSI and current head of the school's Center for Math, Science, and Computer Education. Adds Shirley Malcom, head of education programs at the American Association for the Advancement of Science (which publishes *Science*) and former science board member, "Frankly, I would be skeptical of any big changes in test scores in a few years."

SRI had already conveyed that message to NSF officials in case studies and related publications that had dribbled out over the past few years. In response, NSF officials have rushed to fund a new round of studies aimed at documenting and disseminating what a June 1998 announcement refers to as "inspiring" success stories. Working with grants of up to 3 years, the evaluators will examine all 26 SSI projects for concrete evidence of systemic change. The program announcement reminds researchers that "communicating the results of these impact studies is essential," not just via scholarly articles but also through newspaper editorials, public presentations, and discussions with policy-makers.

NSF officials acknowledge that the need for such evaluations reflects the infant state of knowledge about systemic reform. But they say they are proud of SSI's accomplishments to date. "It's been very successful in raising expectations," NSF's Daryl Chubin, former head of evaluation, told Congress during the July hearing. "We can't guarantee success, but we can help states to be more vigilant." Most project directors say they welcome the help in rallying support for systemic reform. "The [NSF] name has value at the local and state level," says Frances Eberle, head of the Maine SSI project, which ended this summer. "We're disappointed we weren't renewed, but we're very pleased with what NSF has done for us."

Even so, many educators think that the payoff could have been much greater had NSF possessed a clearer idea of where it wanted to go and how to get there. "I laughed when I saw the [most recent evaluation] announcement," says education policy analyst Nancy Saunders of the University of Colorado, Denver, who evaluated Colorado's SSI program, which ended last year. "My reaction was: They should have thought of these things 7 years ago. Now that they know so much, maybe they should start over from the beginning."

—JEFFREY MERVIS

THE SIX DRIVERS OF SYSTEMIC REFORM

1. A comprehensive, standards-based curriculum taught in every classroom.
2. A coherent set of policies that supports high-quality mathematics and science for each student, preparation and continuing education for every teacher, and administrative support for those activities.
3. A coordination of resources designed to support mathematics and science.
4. The involvement of parents, policy-makers, universities, industry, and other segments of society.
5. Evidence of student achievement, including test scores, higher level courses passed, Advanced Placement tests, college admission rates, and college majors.
6. Improvement in the achievement of all students, including those historically underserved.

SOURCE: NSF