

# Student Achievement through USI

## Introduction

NSF's Urban Systemic Initiatives (USI) Program targets the 25 U.S. cities with the largest numbers of school-age children living in poverty. Taken together, these cities represent over 5.5 million children and 250,000 teachers. In 1993-94 each eligible city was awarded up to \$100,000 to undertake a self-study of its K-12 system and develop a plan for system-wide reform. In 1994, nine of the cities (the first cohort) were awarded up to \$15 million per city over five years to implement their plans. In 1995, seven more cities (the second cohort) were awarded funds to implement their proposed reform efforts.

This report offers a first-year synopsis of progress as represented by NSF's programmatic intervention.

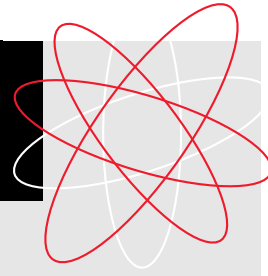
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“Serving all of the Nation’s children, and serving them well, demands an excellent and equitable education system for the 21st century. Urban schools occupy the heart of this commitment.”

*working together to revitalize science & mathematics education*

synergy



## ABOUT SYNERGY

**Synergy** has been an irregular publication of NSF's Directorate for Education and Human Resources (EHR). In newsletter format, it has presented to the various science, mathematics, engineering, and technology education communities information on EHR programs and events, as well as summaries of project results. With this issue, **Synergy** becomes a periodical—still irregular, but more frequent—with a different format. Each issue will highlight an EHR program that is demonstrating progress in reforming the teaching and learning of science, mathematics, engineering, or technology, pre-kindergarten through career entry. The “synergy” derives from NSF working in partnership with organizations throughout the United States and in all sectors of the economy to help foster the positive changes in education to which NSF is dedicated. The ingredients of these outcomes-based, data-laden success stories are unchanging: access to quality science and mathematics education, high expectations for the success of these efforts, proven excellence of materials and their delivery, and measurable gains in learning by all children. Future issues of **Synergy** will also be accessible on EHR's Web site, <http://www.ehr.nsf.gov/index.html>.

## IN THIS ISSUE...

**Synergy** looks at student achievement through the Urban Systemic Initiatives (USI) Program, launched in 1993 with modest planning grants. By the end of 1995, the K-12 systems of nine cities comprising the first cohort of competitively awarded projects had begun in tangible ways to deliver quality science and mathematics to their students. In the words of NSF's Assistant Director for Education and Human Resources, Luther Williams, “A city differs from a state in that it usually has a group that represents its leading businesses and industries... In the last 20 years, these groups have not been close to the school systems—certainly not inner-city school systems. However, because they are motivated by their workforce needs, these groups have come to think of their cities' school systems as likely places to find potential employees. As a result, interest in their school systems has increased dramatically... The synergy is created when these efforts are guided by a program plan operated under the NSF proposal.” If you are still incredulous, then read on. And on. We have many stories to tell.

Welcome to the new **Synergy**.



## Baltimore

Median scores in mathematics and science on the statewide assessment increased for all grades tested, that is, grades 3, 5, and 8.

Low-level mathematics and science courses have been eliminated and all ninth grade students must enroll in biology.

More than 80 percent of all eighth graders are taking algebra.

## Chicago

Percentage of students scoring at or above the national norm in mathematics on the Iowa Tests of Basic Skills increased in all grades tested (3-9, 11).

Increased graduation requirements in science and mathematics.

## Cincinnati

Mathematics test scores improved in 68 percent of all schools.

Increased graduation requirements in science and mathematics.

# Student Achievement through

That intervention was formulated as a highly leveraged, collaborative, and catalytic effort. NSF's internally imposed standards of performance demand excellence in all its programming. In addition, as a Federal agency, NSF must account for the investments of various public and private organizations operating as our partners in the nine localities and demonstrate that we are changing the teaching and learning of mathematics and science by all students.

Before recounting any observed successes, however, NSF seeks to explain—to any parent, citizen, or cosponsor of this effort—the scope of the task at hand. The condition of the nine school systems when NSF funding began was far from robust. Indeed, we have taken on the “hardest possible cases”—systems in disrepair serving populations of disadvantaged children. Serving all of the Nation's children, and serving them well, demands an excellent and equitable education system for the 21st century. Urban schools occupy the heart of this commitment. The Nation's future workforce and economic health are at stake.

Because NSF was determined to become a partner in the strenuous, risky, but essential business of altering education systems to improve learning leading to high achievement by all students, NSF abandoned its traditional funding vehicle—the grant. Instead, the USIs are

funded through cooperative agreements that define the responsibilities of each partner and are renegotiated annually. To fulfill NSF's obligations under the cooperative agreements, we must monitor and document what gains are made, what lags persist, and what changes must yet occur to achieve the teaching and learning of rigorous mathematics and science in the elementary through high school grades.

From the outset, NSF has monitored the activities and progress of the USI cities. A technical assistance contractor developed project overviews of the first cohort in 1994, and a site visit team produced reports on these nine projects in mid-1995. In addition, information has been submitted in response to two other 1995 reporting requirements—a year-end report and a set of statistical datapoints. Taken together, this information helped to establish the educational baselines of cities in the first cohort of USI.

The ultimate measures of systemic reform are its sustained or institutionalized *impacts* as measured both quantitatively and qualitatively. Rather than fostering isolated and piecemeal improvements, NSF hopes to catalyze in a comprehensive way urban educational delivery



# USI continued...

systems to enrich the learning of science and mathematics by the children who are the Nation's demographic and economic future. Thus, the results described here are necessarily partial, preliminary, and tentative. Yet they cohere into a pattern that gives us a plausible basis for hope. This synopsis asserts that *whole systems* of education, as reflected in the teaching and learning of mathematics and science, *can* improve—have indeed begun to improve—and will continue to do so, even in urban settings often regarded as unproductive and unresponsive educational media.

## Building a Record of Achievement

USI's first year of operation was the 1994-95 school year. Even after just one year, the majority of the nine funded cities showed significant results and very promising beginnings in their efforts

to improve learning leading to high achievement in college-preparatory science and mathematics by *all* students.

Most cities have made progress on three related fronts:

- They have reported improvements in student achievement after an intense planning effort followed by just one year of implementation.
- They have raised graduation standards, thereby signaling a seriousness of purpose, a commitment from the top, and a belief that all children can learn challenging science and mathematics. In addition, several cities have begun to eliminate nonrigorous courses (e.g., consumer mathematics) and to add science courses where none had been available (e.g., in elementary and some middle grades).
- They have reallocated resources and generated new resources to support a unitary effort to improve radically

student achievement in mathematics and science.

### Student Achievement:

**Test scores rose in all nine USI cities.** In Chicago, the percentages of students scoring at or above the national norm in mathematics on the Iowa Tests of Basic Skills increased in all grades tested (3-9, 11). In Cincinnati, 68 percent of all schools improved their mathematics test scores. In Dallas, mathematics gains exceeded expectations in six of eight grades tested. In Detroit, a plan to improve student achievement led to performance gains in all subject areas. Mathematics scores increased 7 percentile points on the Michigan Education Assessment Program. In El Paso, Texas Assessment of Academic Skills (TAAS) scores rose in four of six grades tested from 1993-94 to 1994-95.





Percentages passing the TAAS in grades 3, 8, and 10 rose for African-American, Hispanic, and white students. In Dade County/Miami, 75 percent of the USI-involved schools increased their median percentile scores on the Mathematics Applications Subtest of the Stanford Achievement Test. These improvements cut across ethnic lines with greatest gains by African-American and Hispanic students. In Baltimore, median scores in mathematics and science on the statewide assessment increased for all grades tested, that is, grades 3, 5, and 8. In New York, the number of students taking the most demanding (Regents-level) science courses in ninth grade more than doubled, as did the number passing. The number of students taking Regents-level mathematics courses in ninth grade increased by one-third; the number passing increased by over one-fourth. The proportions of African-American students taking and passing Regents-level science and mathematics duplicate those of the population as a whole; for Hispanic students, the proportions were double those of the population as a whole.

**Graduation Requirements:**  
*Graduation requirements have been raised in Baltimore, Chicago, Cincinnati, Dallas, El Paso, and Dade*

**County.** In Baltimore, low-level mathematics and science courses have been eliminated and all ninth grade students must enroll in biology. In Chicago, all students must complete algebra by the end of eighth grade. In Cincinnati, low-level courses in mathematics and science also have been eliminated. And in Dade County, algebra I has become a graduation requirement starting with the class of 1998. In Dallas, science and mathematics requirements have been established for all grades, K-12.

**Availability of Science and Mathematics Instruction:** *Cities have made high-quality science and mathematics available.* In Baltimore and Dallas, science is being taught in all elementary grades, with more than 80 percent of all Baltimore eighth graders taking algebra. In Chicago, reading in the content areas of science and mathematics is being added. In Cincinnati, credit-granting standards for algebra, geometry, biology, and chemistry have been established. In Phoenix, all consumer mathematics courses have been eliminated. And in Dade County, more students are taking more rigorous science and mathematics courses (e.g., a doubling of sixth and seventh graders taking pre-algebra, and a 72 percent increase in analysis of functions/pre-calculus enrollment).

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## Dallas

Mathematics gains exceeded expectations in 6 of 8 grades tested.

Increased graduation requirements in science and mathematics.

Passed a \$275 million bond issue for capital improvements, including technology applications.

## Detroit

Initiated a plan to improve student achievement leading to performance gains in all areas. Mathematics led the way with gains that averaged 7 percentile points.

Passed a \$1.5 billion bond issue to renovate science and mathematics classrooms and laboratories.

## El Paso

Texas Assessment of Academic Skills (TAAS) scores rose in 4 of 6 grades tested from 1993-94 to 1994-95.

Percentages passing the TAAS in grades 3, 8, and 10 rose for all students.

Increased graduation requirements in science and mathematics.



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energy

# Student Achievement through USI *continued...*



**Partnerships and Funding:**  
*Districts redirected their use of locally controlled funds, including those that flow through from the U.S.*

*Department of Education such as Title I and Carl Perkins Act funds.*

Chicago, Cincinnati, Dade County, Dallas, El Paso, and Phoenix all report taking that action. In Detroit, Dallas, and Phoenix (as well as in two cities in the second cohort of USIs—Fresno and New Orleans), bond issues passed that will

be used to upgrade the equipment and technology access for science and mathematics instruction. Several cities have developed niche-specific partnerships with businesses and private foundations including Annenberg, Pew, IBM, O'Donnell, Motorola, Texas Instruments, and Mobil.

## Conclusion

NSF's overall investment of some \$16.8 million has leveraged or redirected substantial resources to the support

of education reform.\* To date, over \$50 million has been contributed in additional funds from non-NSF sources, a 3-to-1 ratio. These funds impacted 526 schools, 33,468 teachers, and 439,347 students in the 1994-95 school year. The potential impacts of the judicious application of resources to mathematics and science teaching and learning are even greater. With seven additional cities beginning their implementation work in 1995-96, USI will affect 150,000 teachers and 3.7 million students by the time each of the 16 cities has completed five years. Most important, each city will have profoundly altered its educational system to sustain the benefits achieved well into the future.

The purpose of this preliminary report is not strictly evaluative. Continued monitoring, progress reports, and future evaluations of the program as a whole will have to demonstrate the value of USI. Nevertheless, these are promising results—small increments that foreshadow large systemic changes. NSF is dedicated to accelerating this process and producing, with our many partners, improved life chances through academic performance of the children in USI cities. This is imperative, for these children today are tomorrow's citizens and workers. They *are* the future.

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## Dade Co./Miami

Among Dade's Schools, 75 percent improved on the Mathematics Applications Subtest of the Stanford Achievement Test.

These improvements cut across ethnic lines with greatest gains among African-American and Hispanic students.

Increased graduation requirements in science and mathematics.

## New York City

Number of students taking the most demanding (Regents-level) science courses in ninth grade more than doubled as did the number passing.

Number of students taking Regents-level mathematics courses in ninth grade increased by one-third; the number passing increased by over one-fourth.

Proportions of African-American students taking and passing Regents-level science and mathematics duplicate those of the population as a whole; for Hispanic students, the proportions were double those of the population as a whole.

## Phoenix

All consumer mathematics courses have been eliminated.

Passed bonds totaling over \$3.5 million to be used for technology instruction, software, and hardware.

\*This amount reflects the cost of planning grants and first-year implementation awards to nine cities.