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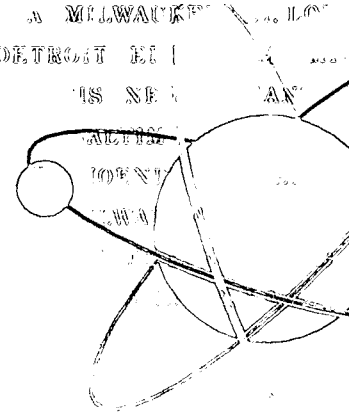
ABSTRACT

This report presents findings from an evaluation of the National Science Foundation's (NSF's) Urban Systemic Initiative (USI) program in 22 large urban school districts. The USI program has supported educational reform in large public school districts that have a high percentage of students living in poverty and has directed its efforts toward the improvement of mathematics and science achievement in these schools. The NSF's Six Drivers of Systemic Reform provided a framework for USI implementation, focusing on standards-based curriculum and instruction, aligned assessment, policies, professional development, convergence of resources, leadership, and partnerships. The report presents evidence of noteworthy gains in student achievement, with the greatest gains seen in districts participating in the USI program for the longest period of time. Urban students in USI districts have substantially increased their enrollment rates in mathematics and science gatekeeping and higher level courses. Under-represented minority students made even greater enrollment gains than their peers during the same time period, resulting in reduced enrollment disparities. More 11th and 12th graders are taking college entrance examinations, indicating that more students aspire to pursue higher education. These advances are accompanied by evidence that urban districts are developing the infrastructure to sustain achievement gains (policies encouraging enrollment in gatekeeping and higher level mathematics and science courses, strengthened professional development, new ways of managing partnerships and resources, and data-driven accountability systems). (SM)

Academic Excellence for All Urban Students

Their Accomplishment In Science and Mathematics

Urban Systemic Initiatives



Study funded by a grant from the National Science Foundation

"How Reform Works:
An Evaluative Study of NSF's Urban Systemic Initiatives"

April 2001

Systemic Research, Inc.

USI EVALUATIVE STUDY

Academic Excellence for All Urban Students

Their Accomplishment In Science and Mathematics

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For the:

National Science Foundation
Directorate for Education and Human Resources

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How Reform Works:
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Evaluative Study Publications:

- *What Matters in Urban School Reform*, Study Monograph No. 1, by M. Ware, L. Richardson, and J. Kim, Systemic Research, Inc., March 2000.
- *Survey Results of Urban School Classroom Practices in Mathematics and Science: 1999 Report – Using the Survey of Enacted Curriculum Conducted during Four USI Site Visits*, Study Monograph No. 2, by R. Blank, J. Kim, and J. Smithson, Systemic Research, Inc., June 2000.
- *Urban School Key Indicators of Science and Mathematics Education: Based on Key Indicator Data System (KIDS-1999), Volume I, II, III, IV, and Appendix*, by J. Kim, H. Lee, L. Crasco, D. Lee, A. Karantonis, and D. Leavitt, Systemic Research, Inc., September 2000.
- *Survey Results of Urban School Classroom Practices in Mathematics and Science: 2000 Report – Using the Survey of Enacted Curriculum Conducted during Eight USI Site Visits*, Study Monograph No. 3, by J. Kim, L. Crasco, R. Blank, and J. Smithson, Systemic Research, Inc., April 2001.

This report is also available on the World Wide Web:
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April 2001

EXECUTIVE SUMMARY

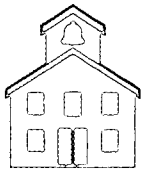
Since 1993, the National Science Foundation's Urban Systemic Initiative (USI) program has been a catalyst for large-scale systemic change directed towards improving the science and mathematics achievement of ALL urban students. This report presents preliminary findings from an evaluative study of NSF's USI program among 22 large urban school districts. NSF's Six Drivers of Systemic Reform provided a framework for USI implementation, focusing on standards-based curriculum and instruction, aligned assessment, policies, professional development, convergence of resources, leadership, and partnerships.

This report presents evidence of noteworthy gains in student achievement, with the greatest gains seen in school districts that have participated in the USI program for the longest period of time. Urban students in USI school districts have substantially increased their enrollment rates in mathematics and science gate-keeping and higher-level courses. Underrepresented minority students made even greater enrollment gains than their peers during the same period, resulting in reduced enrollment disparities. Assessment test results show that USI students have made gains in science and mathematics achievement, while reducing achievement gaps among racial/ethnic groups. The increasing numbers of 11th and 12th grade students taking college entrance examinations (AP, SAT, and ACT) indicate that more students have aspirations of pursuing post-secondary education.

These advances are accompanied by evidence that urban districts are developing the infrastructure to sustain achievement gains – policies that encourage enrollment in gate-keeping and higher-level mathematics and science courses, strengthened professional development programs, new ways of managing partnerships and resources, and data-driven accountability systems. USI programs have invested heavily in professional development believing it to be a key lever for improving student outcomes. Our Enacted Curriculum Survey found that teachers with professional development in standards-based curriculum and instruction report teaching practices that are more consistent with state and national standards.

The infrastructure of partnerships built around each USI site provided strong support for systemic changes based on their unique capacity, resources, and experiences. The partners and school districts interacted as part of a unified effort to promote and support large-scale education reform. Partnerships were formed with interested community members including higher education institutions, corporations, foundations, informal institutions, research centers and laboratories, parents, and other federal/state/local programs.

Education reform is a complex, long-term process that requires simultaneous changes in expectations, policies, curriculum, assessment, professional development, student support systems, data use, and the allocation of resources. As students are exposed to high expectations, a rigorous and engaging curriculum, and better instructional methods, NSF's investment will continue to result in improved outcomes for all urban students. Much has been done; more remains to be accomplished.



ACCOMPLISHMENTS OF URBAN SCHOOL STUDENTS

Preliminary findings from the ongoing "How Reform Works: An Evaluative Study of National Science Foundation's Urban Systemic Initiatives" indicate significant improvement in mathematics and science achievement among K-12 students in major urban school districts. Mathematics and science gate-keeping course enrollment and completion rates have steadily increased since school year (SY) 93-94. Many of the assessment test results also indicate steady improvement. In the majority of the sites, underrepresented minority students made greater academic gains in mathematics and science than their peers during the same time period, which resulted in reduced achievement gaps. This report summarizes achievements in 21 USI sites in Cohorts 93 - 97. Cohort 99 (Houston) is not represented as no trend data were available by SY 98-99.

URBAN SYSTEMIC INITIATIVES (USI)

To enhance the academic achievement of urban students, the USI program has supported educational reform in 22 large public school districts that have a high percentage of their students living in poverty. The aim is to improve the mathematical and scientific literacy of ALL students in urban communities. A solid foundation in mathematics and science will prepare students for higher education in these areas, and allow them to pursue 21st century careers in mathematics, science, and technology.

NSF launched the USI program in 1993, applying lessons learned from its earlier reform effort, the State Systemic Initiative (SSI). Other NSF educational reform programs include the Rural Systemic Initiative (RSI), and, for middle-sized cities, the Comprehensive Partnerships for Mathematics and Science Achievement (CPMSA). The USI and CPMSA systemic initiative programs have recently evolved into the Urban Systemic Program (USP).

22 USI Sites

Cohort 93
Baltimore, Chicago, Dallas, Detroit, El Paso, Miami-Dade, New York, Phoenix

Cohort 94
Cleveland, Columbus, Fresno, Los Angeles, Memphis, New Orleans, Philadelphia

Cohort 95
Milwaukee, St. Louis, San Antonio, San Diego

Cohort 97
Atlanta, Jacksonville

Cohort 99
Houston

Urban Systemic Initiatives

Cohort 93 (8)
Cohort 94 (7)
Cohort 95 (4)
Cohort 97 (2)
Cohort 99 (1)

Total (22 Sites)

These NSF programs are catalysts for large-scale systemic changes directed toward improving the mathematics and science achievements of all students, including those historically underserved. NSF stipulates that all children can learn if they are provided with rich learning environments. The goal is comprehensive systemwide changes that dynamically create and sustain an educational infrastructure to support mathematics and science teaching and learning. This infrastructure includes standards-based curriculum and instruction, aligned assessment, professional development for teachers, convergence of educational resources, and community partnerships. Additional crosscutting issues are equity, quality, scaling up, coordination, and organization.

USI Facts in Brief (SY 1998-99)

Students: Total 4.5 Million

Black 41%
Hispanic 38%
White 15%
Asian/Pacific Islander 6%
American Indian 0.3%

Male 51% , Female 49%

Schools: Total 5,559

3,710 Elementary Schools
837 Middle Schools
864 High Schools
148 Ungraded Schools

Teachers: Total 158,163

126,018 Elementary
17,143 Mathematics G6-12
15,002 Science G6-12

75% of teachers participated in Professional Development

Selected Key Indicators (Average of USI sites)

Free/Reduced Lunch 69%
Limited English Proficient 12%
Special Education 13%
Daily Attendance 90%
Drop-out Rate 12%
Mobility Rate 31%
Per Pupil Spending $7,278
Average Class Size 24.4
Classrooms with Internet Access 53%

Sources:

- *Urban School Key Indicators of Science and Mathematics Education – Based on Key Indicator Data System (KIDS-1999), Volume IV,* Systemic Research, Inc., September 2000.
- *Systemic Initiatives Core Data Elements Findings: 1998-1999 School Year Collection Summary Report (CDE-1999),* Westat, Inc. and QRC, July 2000.

IMPACT OF USI

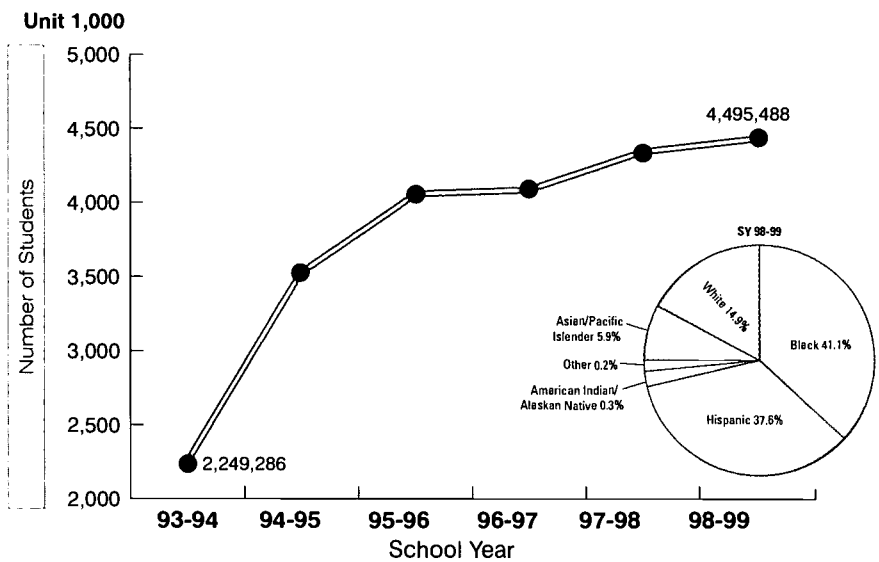
When the USI began, the program impacted about 2.2 million students in the first cohort of eight USI sites as shown in Exhibit I. Between 1994 and 1997 three additional cohorts received USI grants bringing the total to 21 cities. In SY 98-99 the number of students in these cities was over 4.5 million, or 10% of all American students who attended public schools.

About 80% of those attending these urban schools are underrepresented minority students. They are also among the poorest students in the United States, with 69% of the students eligible to receive free or reduced lunch. In addition, 12% are children who have limited English proficiency and 13% receive special education services.

During SY 98-99, over 5,500 schools were impacted by the USI program. About 86% of these schools received direct services from the program.

In SY 98-99, USI districts included 158,163 teachers: 126,018 elementary, 17,143 secondary mathematics, and 15,002 secondary science teachers. During that school year 75% (118,399) of these teachers participated in professional development activities.

Exhibit I: Number of Students Impacted by USI



"In the 5 years I have been here, we are more into active learning with students. USI has had a major impact on it. We have gone from a school of teachers lecturing to teachers becoming more the guides and students working cooperatively. You see them up and moving and involved."

– A Principal in a USI school

SIX DRIVERS OF SYSTEMIC REFORM

Over the course of its systemic initiative programs, NSF has developed a theoretical structure for systemic reform. There are six "drivers" that NSF has found to be central to successful school reform. Our preliminary study findings indicate that implementation of these drivers has an important influence in successfully reforming and restructuring school district infrastructure within each city.

NSF's Six Drivers of Systemic Reform
1. Standard-based Curriculum, Instruction, and Assessment
2. Policy Support for High Quality Learning and Teaching
3. Convergence of Educational Resources
4. Partnerships and Leadership: Broad-Based Support
5. Measures of Effectiveness Focused on Student Outcomes
6. Achievement of ALL Students, Including Those Historically Underserved

STANDARD-BASED CURRICULUM AND INSTRUCTION

Standards-based curriculum means that instructional methods and materials are aligned with national and/or state standards. The purpose of the standards is to define what all children should know and be able to do at certain points in their education.

There are many national and state standards for mathematics and science. Many USI sites align their mathematics curriculum to the National Council of Teachers of Mathematics (NCTM) Standards, and their science curriculum to the American Association for the Advancement of Science (AAAS) Benchmarks, National Research Council (NRC) Standards, or to the National Science Education Standards (NSES).

Numerous states have developed their own standards that are aligned with the national standards. For example, Dallas, El Paso, and San Antonio abide by the Texas Essential Knowledge and Skills standards, and Miami-Dade and Jacksonville follow the Florida State Sunshine Standards.

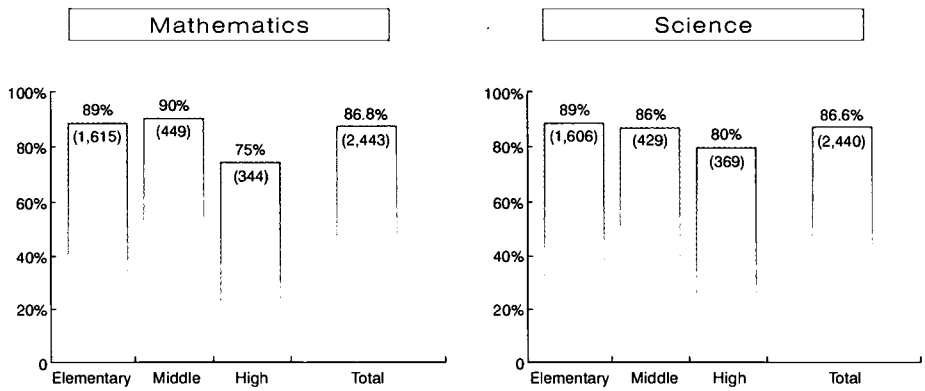
Nearly all of the USI sites have decreased their emphasis on lecture and demonstration methods of teaching and moved towards inquiry-based instruction. Some educational theorists – Dewey, Brunner, Piaget, and Featherstone – believe that the hands-on, inquiry-based method of instruction benefits most students' learning. Students learn when they actively work out solutions to problems themselves.

Curriculum materials based on national and state standards and the inquiry-based mode of instruction are widely available. Numerous USI sites have adopted many of the same materials – typical examples are as follows:

	Mathematics	Science
Curriculum Materials	• Connected Math Project (CMP) G6-8 • Everyday Mathematics K-G6 • Interactive Mathematics Program (IMP) G9-12 • Investigations in Number, Data, and Space K-G5 • Mathland K-G6	• Full Option Science System (FOSS) K-G6 • Insights K-G6 • Science and Technology for Children (STC) K-G6 • Science Education for Public Understanding Program (SEPUP) G4-9

The USI program, as do all Federal programs, must follow the Government Performance and Results Act (GPRA). For the USI, GPRA requires implementation of a standards-based curriculum by 80% of the schools that participated in the program for at least three years. A school is in compliance if at least one third of its mathematics and science teachers have implemented a standards-based curriculum. According to the Core Data Elements (NSF's annual data collection system) for SY 98-99, 86.8% of USI schools reached the GPRA goal for mathematics and 86.6% reached the goal for science as shown in Exhibit II.

Exhibit II: USI Schools Implementing Standards-Based Curriculum*



* Percent of schools participating for 3 years or more in which at least one-third of the teachers teaching mathematics and science have implemented a standards-based curriculum.

(#) indicates number of schools

Source: CDE-1999

STANDARDS-BASED ASSESSMENT

Assessment provides critical information about an individual student's mathematics and science achievement. Assessment also provides a feedback system that allows an entire school district to account to the public about progress in helping all children to learn. In order to meet these ends, testing instruments must be aligned to both curriculum content and instructional methods.

Several trends emerged from our analysis of assessment practices. Standardized assessment is more common in elementary and middle schools than it is in high schools. In addition, more school districts assess mathematics achievement than science achievement.

Assessment Instrument	Number of USI Sites Implementing Standardized Tests					
	Mathematics			Science		
	Elem	Middle	High	Elem	Middle	High
District Designed Test	1	1	2	1	1	2
Iowa Test of Basic Skills	4	4	2	3	3	2
Standford Achievement Test 8/9	8	8	6	7	7	4
State Designed Test	11	12	10	7	11	9
Other	3	2	2	4	4	3

POLICY SUPPORT FOR HIGH QUALITY LEARNING AND TEACHING

One challenge for urban school districts is to establish policies that create the expectation that all students can reach the same high standards, while being responsive to different learning styles and being sensitive to the needs of a diverse group of children. Policies that promote equal access to high quality, challenging mathematics and science courses in high school are the backbone of mathematics and science reform. Gate-keeping and higher-level mathematics and science courses provide a solid foundation in these subjects. Research has indicated that students who enroll in and complete these courses are more likely to pursue higher-level courses and post-secondary education. These courses are as follows:

Mathematics	Science
• Algebra I or above in 8th Grade	• Biology
• Geometry	• Chemistry
• Algebra II	• Physics
• Calculus	• Integrated Science I, II, and III
• Integrated Math I, II, III, and IV	

Of the many policies and practices that have a potential impact on student achievement, many USI sites have implemented the following policies promoting access to high quality learning and teaching:

◦ Scale-up Strategy

All of the USI sites (with the exception of Phoenix, which included all of its schools from the beginning) implemented the USI program using a scale-up strategy. Cohorts of USI schools were selected, with the focus of the reform efforts directed towards these schools. Each year additional schools are added until the goal of 100% involvement of the district's schools is reached. The majority of sites planned to implement the program systemwide by the fourth year. In Cohorts 93 and 94, 10 out of 15 sites implemented the program in more than 95% of their schools by the fourth year. In Cohort 93, Dallas, Detroit, Miami-Dade, New York, and Phoenix implemented the program in at least 95% of their schools, and in Cohort 94, Cleveland, Fresno, Memphis, New Orleans, and Philadelphia implemented the program in 99% or more schools by the fourth year.

◦ Student Tracking

Tracking is the practice of grouping students by their perceived ability and steering them into specific courses. This results in lower aspirations and expectations for many students. Thirteen USI sites reported that tracking was eliminated in the first year of implementation; they accomplished this by eliminating all remedial and "non college-preparatory" mathematics and science courses.

◦ Graduation Requirements

Science and mathematics requirements for high school graduation have increased in most USI districts as shown in Exhibit III. At the start of involvement in the USI program, seven sites required two years, 13 sites required three years, and one site required four years of mathematics for graduation. In SY 98-99, only one site still required two years of

mathematics, whereas 17 sites required three years and three sites required four years for graduation. In all, eight sites increased their expectations for student mastery of mathematics.

For science, the findings are parallel. At the start of involvement in the USI program, two sites required one year, ten sites required two years, eight sites required three years, and one site required four years of science for graduation. In SY 98-99, seven sites still required two years of science, while 13 sites now required three years and two sites required four years for graduation. A total of seven sites raised their graduation requirements for science.

It is noteworthy that 12 sites exceed state graduation requirements for mathematics and eight sites exceed state requirements for science.

Exhibit III: High School Graduation Requirement Changes in Mathematics & Science From Baseline to SY 1998-99

		Mathematics (Number of Years) 1 2 3 4	Science (Number of Years) 1 2 3 4	Algebra I & Geometry Required	Laboratory Science Required	District Requirements Higher than State Requirements: Math	District Requirements Higher than State Requirements: Science
Cohort 93	Baltimore	□	□	Yes	Yes	No	No
	Chicago	→	→	Yes	Yes	Yes	Yes
	Dallas	→	→	Alg.1	No	Yes	Yes
	Detroit	→	→	No	No	N/A	N/A
	El Paso	□	□	Yes	Yes	No	Yes
	Miami-Dade	□	□	Yes	Yes	No	No
	New York	□	→	Yes*	Yes*	Yes	No
	Phoenix	→	□	No	No	Yes	No
Cohort 94	Cleveland	→	→	No	No	Yes	Yes
	Columbus	→	→	No	No	Yes	Yes
	Fresno	→	→	Yes	Yes	Yes	Yes
	Los Angeles	□	□	No	No	Yes	No
	Memphis	□	□	Alg.1	Yes	No	No
	New Orleans	→	□	Alg.1	Yes	Yes	No
	Philadelphia	□	□	No	No	No	No
Cohort 95	Milwaukee	□	□	No	No	No	No
	St. Louis	□	□	No	No	Yes	Yes
	San Antonio	□	□	Alg.1	Yes	No	No
	San Diego	□	□	Yes	Yes	Yes	No
Cohort 97	Atlanta	□	□	No	No	No	No
	Jacksonville	□	□	Yes	Yes	Yes	Yes

→ Indicates changes in the number of years required for graduation from baseline to SY 1998-99

□ Indicates no change in the number of years required for graduation from baseline to SY 1998-99

* Regents Level Courses

These more challenging graduation requirements have not resulted in a decline in graduation rates. In fact, graduation rates have increased slightly between the baseline year and SY 1997-98, from 84.2% to 84.9% according to KIDS-1999.

- **Safety-Net Programs**

  The safety net for those students experiencing difficulty with challenging mathematics and science courses has been broadened with the implementation of the USI. Examples of safety-net programs include tutoring, after school enrichment programs, summer school, parent-teacher conferences, Individual Education Plans for special education students, and bilingual programs for Limited English Proficient students.

- **Special Education and Limited English Proficient Students**

  Most of the USI sites practice inclusion – mainstreaming special education students into "regular" classrooms whenever possible. A basic premise of the USI program is that all students can learn. Therefore, with safety-net programs in place, special education and Limited English Proficient students are held to the same high standards as regular students.

PARTNERSHIPS AND LEADERSHIP: BROAD-BASED SUPPORT

Partnerships

Every USI site reported numerous strong partnerships. The infrastructure of partnerships built around each USI site provided strong support for systemic changes based on their unique capacity, resources, and experiences. The partners and school districts interacted as part of a unified effort to promote and support large-scale education reform. These partnerships created avenues to connect all interested community members with the school system. Exhibit IV visualizes the general infrastructure of USI partnerships by identifying partner group entities with their typical roles and services. These six groups are: higher education; corporations and foundations; informal institutions; parents and communities; research centers and laboratories; and other federal/state/local programs.

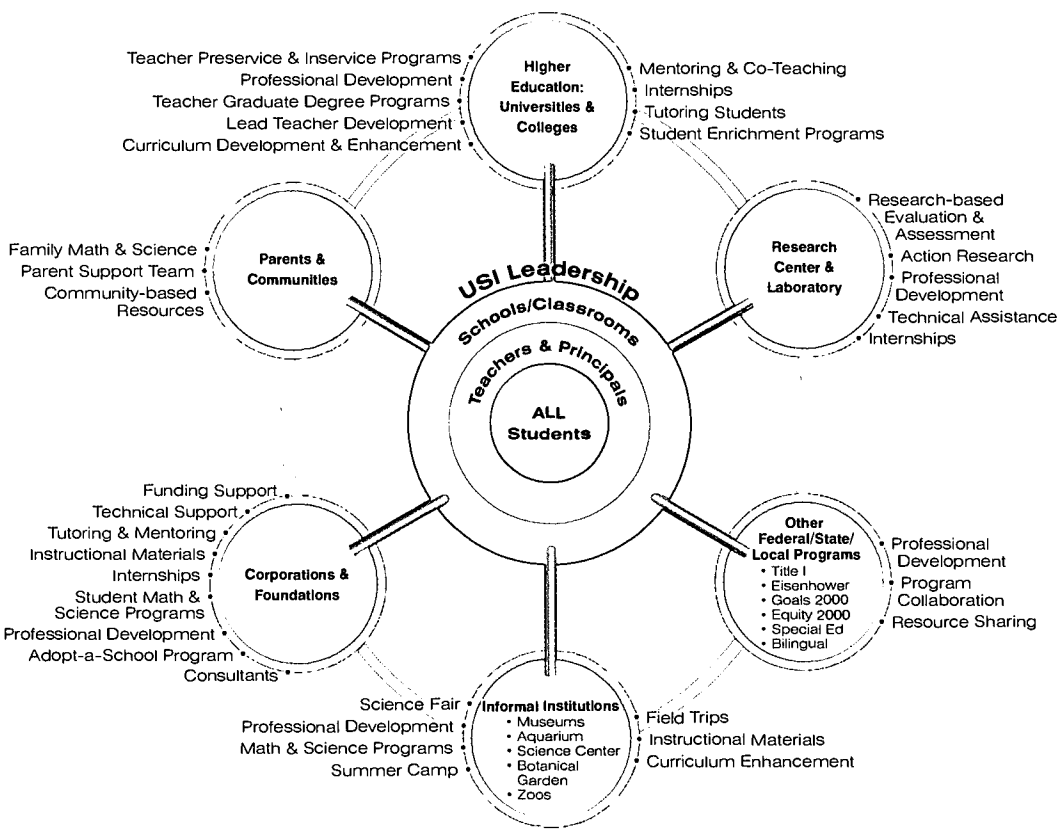
Higher education partners – over 130 universities and colleges were reported in KIDS-1999 – supported a high quality K-16 mathematics and science continuum targeted to all K-12 students and teachers. To achieve this goal, various programs and activities have been designed and implemented. Examples include: teacher preservice and inservice programs; professional development; teacher graduate degree programs; curriculum development and enhancement; mentoring and co-teaching; internships; tutoring students, and various student enrichment programs.

For example, Dallas USI higher education partners – 12 state and private universities and colleges – provided assistance with professional development for preservice teachers, recertification of current teachers, and provided custom-designed coursework that meet state and district curriculum frameworks. For the Memphis USI, the University of Tennessee, Christian Brothers University, University of Memphis, and LeMoyne-Owen College provided student summer enrichment activities in science, technology and algebra, tutorial programs, algebra study labs, and Saturday Academies to support achievement in algebra, geometry, precalculus, physical science, biology, chemistry and physics. Other Saturday programs were aimed at science and mathematics activities for elementary school students. The universities also collaborated with the Memphis USI to provide professional development.

Informal institutions – more than 110 institutions were reported in KIDS-1999 – offered rich learning and teaching environments for hands-on, inquiry-based mathematics and science education. For example, Baltimore USI students and teachers took advantage of the Consortium of Informal Science Institutions including the Baltimore Zoo (over 31,000 student visits, 90 students attended summer camp, 28 science teachers participated in workshops during SY 97-98), Columbus Center (1,400 students and 32 teachers involved), National Aquarium, Maryland Science Center (26,050 students, 70 adults, and 674 teachers reached), Irvine Nature Center (8 schools involved in science project), and the Chesapeake Bay Foundation (500 students and 135 teachers involved). The consortium facilitated communication and resource sharing among member institutions, aligned program offerings to the Baltimore City Public School System (BCPSS) and Maryland state content standards, and made an effort to involve under-represented minority families and community members in supplemental science, mathematics, and technology activities.

Partnerships were formed with more than 125 corporations, foundations, research centers, and laboratories. These partnerships played a major role in educational technology training, and funding support. For example, in the School District of Philadelphia, numerous organizations (Annenburg Institute for School Reform, The Association for the Advancement of Science, Franklin Institute, Princeton Plasma Physics Laboratory, Texas Instruments, Inc., Voyager Expanded Learning, Inc., Jason Foundation, etc.) provided science and mathematics professional development regarding research-based evaluation and assessment, inquiry-based teaching, and curriculum content and materials. Two additional NSF-funded initiatives, the Collaborative for

Exhibit IV: USI Partnership Infrastructure to Support Learning & Teaching

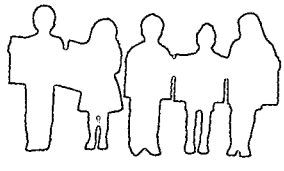


Excellence in Teacher Preparation (CETP) and Sisters in Science, were closely coordinated to develop new science and mathematics courses, provide after-school programs for students, classroom assistance for teachers, and model professional development programs.

Most USI sites reported forming parent and community partnerships. The Detroit USI highlighted an exemplary parent and community partnership with a priority on family-based mathematics and science education. Family Mathematics and Science programs strengthened the link between home and school considered essential to the realization of the goal of each student reaching his or her maximum potential. Detroit's Michigan Statewide Systemic Initiative (MSSI) Focus District Grant made significant contributions to the family programs. The Center for Learning Technologies in Urban Schools (LeTUS) is a partnership among Detroit Public Schools, Chicago Public Schools, The University of Michigan, and Northwestern University. The focus of this group is to infuse educational technology in the middle school curriculum.

Leadership

When the school district's superintendent supports the USI project and has continuity of employment, rates of student participation in mathematics and science courses are enhanced. An effective project director and staff can sustain the program even when there is turnover in the superintendent's office. To assess the effects of leadership, our evaluative study team assigned rubric scores to each site based on their assessment of 1) the continuity of the superintendent and his or her support of the USI program, 2) whether the USI project director directly reports to the superintendent, and 3) whether there are sufficient numbers of USI staff to implement the program. The latter two items compose an index of the effectiveness of the USI project director and staff. When statistical methods were applied in the initial analysis to assess the impacts of these variables on the percent change in the combined rate of mathematics and science course enrollment, the effect of a stable and supportive superintendent becomes apparent. This effect is more than twice as large as that of the index that combines the effects of the USI project director's reporting relationship with the superintendent and the size of the USI staff.[1]



[1] The standardized regression coefficients that assess the impacts of the variables are: 0.49 for Stable and Supportive Superintendent, and 0.21 for the index based on the effectiveness of the USI Project Director and Staff. Both effects are large and statistically significant ($p<.001$).

CONVERGENCE OF EDUCATIONAL RESOURCES

The funding provided by the USI program is intended to be a catalyst for the mathematics and science education reform effort. While comprising only a small amount of the total school district budget, the USI money is discretionary. According to the Core Data Element Findings (CDE-1999), each site's USI funds have leveraged in-kind contributions averaging $11 million during fiscal year 1999 from various sources, such as Federal, state, local, higher education, business, industries, and private foundations.

USI resources are serving a lead role in changing the infrastructure within the school districts. During site visits and interviews conducted in years 1999 and 2000, the study team observed collaboration among USI, Title I, Eisenhower, other federal initiatives, and state and local funding to create a source of revenue for professional development, curriculum materials, and special programs. Twenty USI sites reported that they leveraged a total of $547 million in additional funding to support SI activities during FY 1999.

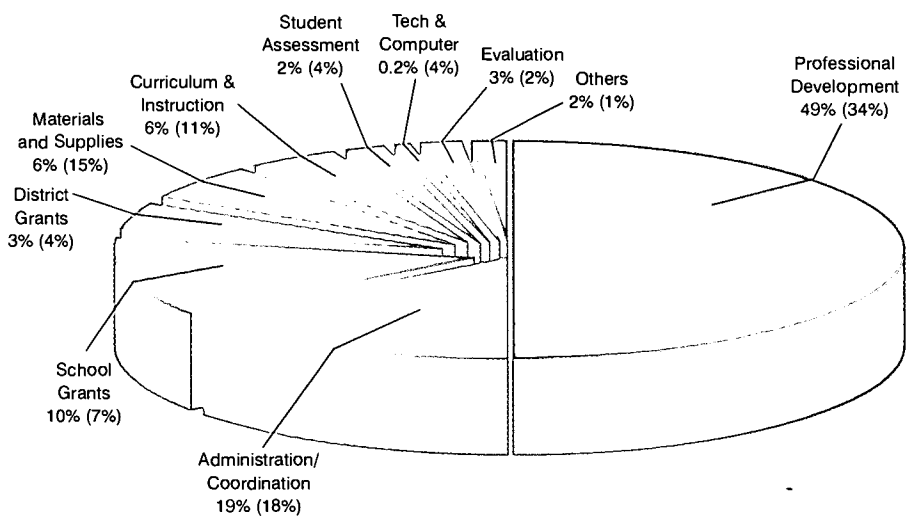
Additional Funding to Support SI Activities in FY 1999

Source	$ Amount in Million
Other District/School Funds	166
State	148
Title 1	134
Eisenhower	24
Department of Education	14
D.O.E. Goals 2000	8
Other NSF Funds	6
Corporate	5
Foundation Grants	2
Other	40
Total Leveraged	**$547 Million**

Source: CDE-1999

Exhibit V illustrates the percentage distribution of average USI and total budgeted funds (from all sources) directed towards reforming mathematics and science education during fiscal year 1999. In general, USI expenditures parallel those from all other sources. Professional development activities are the largest budget item for both USI (49% of total USI funds) and total SI funds (34% of total SI funds).

Exhibit V: Average Percentage of USI Budget Allocation in Comparison to District-Wide SI Budget in FY 1999*



(%) Indicates District-wide percentage

* Refers to all funds (from any source) that are being directed toward reforming mathematics and science in the Systemic Initiative during FY 1999.

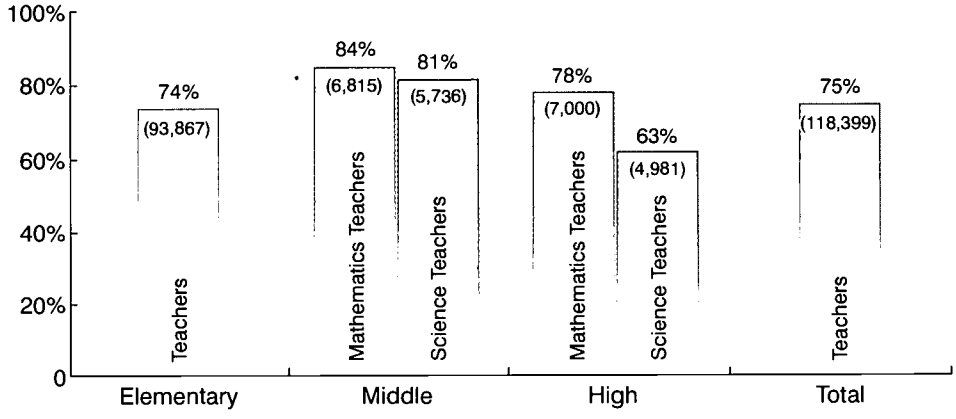
Source: CDE-1999

PROFESSIONAL DEVELOPMENT

Professional development is a major strategy used by all USI sites and supported by a variety of district policies. The primary aims of professional development activities are to improve teachers' content knowledge, pedagogic skills for inquiry-based teaching, and methods of assessing student learning. An average of 49% of USI funds were spent on professional development activities across all of the USI sites.

During the 98-99 school year, 75% (118,399) of teachers working in USI schools attended some form of professional development. Middle school mathematics (84%) and science (81%) teachers had the highest rates of participation in professional development activities as shown in Exhibit VI.

Exhibit VI: Percent of Teachers who Participated in Professional Development by School Level SY 1998-99



(#) Number of Teachers who Participated in Professional Development
Source: KIDS-1999

Each district delivers professional development in its own way, but there are commonalties found across all 21 USI sites. Science and mathematics professional development focuses on mastery of content knowledge and standards, pedagogy, and assessment strategies. Other topics covered include the use of specific curriculum packages the district has adopted (i.e., Connected Math Project, Full Option Science System), technology, leadership training, and new teacher orientation. The professional development activities are conducted during summer institutes, Saturday training sessions, after school programs, and during the school day with classroom coverage by substitutes. In addition, site-based and classroom professional development is provided by lead teachers. In most sites, the USI leads the planning and implementation of professional development in collaboration with other federal grants (i.e., Title I, Eisenhower) and the regular school budget. Universities, colleges and other institutions (i.e., science centers and museums) support professional development through in-kind contributions of instructors, and/or materials and through tuition reductions or waivers.

As mentioned above, another common approach to professional development is the identification and training of lead teachers (i.e., Resource Teachers in Los Angeles, Key Teachers in San Diego, and Model Teacher Leaders in Atlanta) who serve as mentors, models, peer coaches, and curriculum support resources for teachers in the schools in which they work. These teachers focus on developing ways to support classroom change at the individual school level. The use of lead teachers was reported by 14 of the 19 sites. These teachers are supported by Teacher Academies or Leadership Institutes in five US districts.

Principal Institutes were established in seven sites – Baltimore, Fresno, Memphis, Miami, New York City, Phoenix, and San Diego – to assist school based administrators to mentor teachers, and to support their efforts to adapt new curriculum content and pedagogy. These institutes also directly addressed the issues of standardized testing, use of results to evaluate learning and teacher performance, and over-all school improvement plans.

To explore the impact of professional development (PD) on teaching practices and student achievement, our USI evaluative study team conducted a Survey of Enacted Curriculum in four Cohort 93 USI sites (Baltimore, Dallas, Detroit, and Phoenix) in 1999 and four Cohort 94 sites (Columbus, Fresno, Memphis, and Philadelphia) in 2000. The survey provides an analysis of urban school classroom practices in mathematics and science,
in relation to expectations for practice as outlined in state/district content standards, reform initiatives, and standards-based assessment. The third evaluative study monograph, entitled *Survey Results of Urban School Classroom Practices in Mathematics and Science: 2000 Report*, reports the summary of findings based on the responses from a total of 317 teachers. A few highlights are:

- About 80 to 90% of USI teachers were actively involved in professional development, which focused on content standards, in-depth study of content, curriculum implementation, multiple strategies for assessment, and new methods of teaching. Teachers report that as a result of professional development they are using and applying new methods and standards in classrooms (average 2.3 on scale of 1 to 3: scale 1 = had little or no impact, 2 = trying to use, and 3 = changed my teaching practice).

- In science, teachers with High PD (more than 16 hours in content and pedagogy) report greater use of multiple assessments than their counterparts with Low levels of professional development (Low PD), especially at the elementary level.

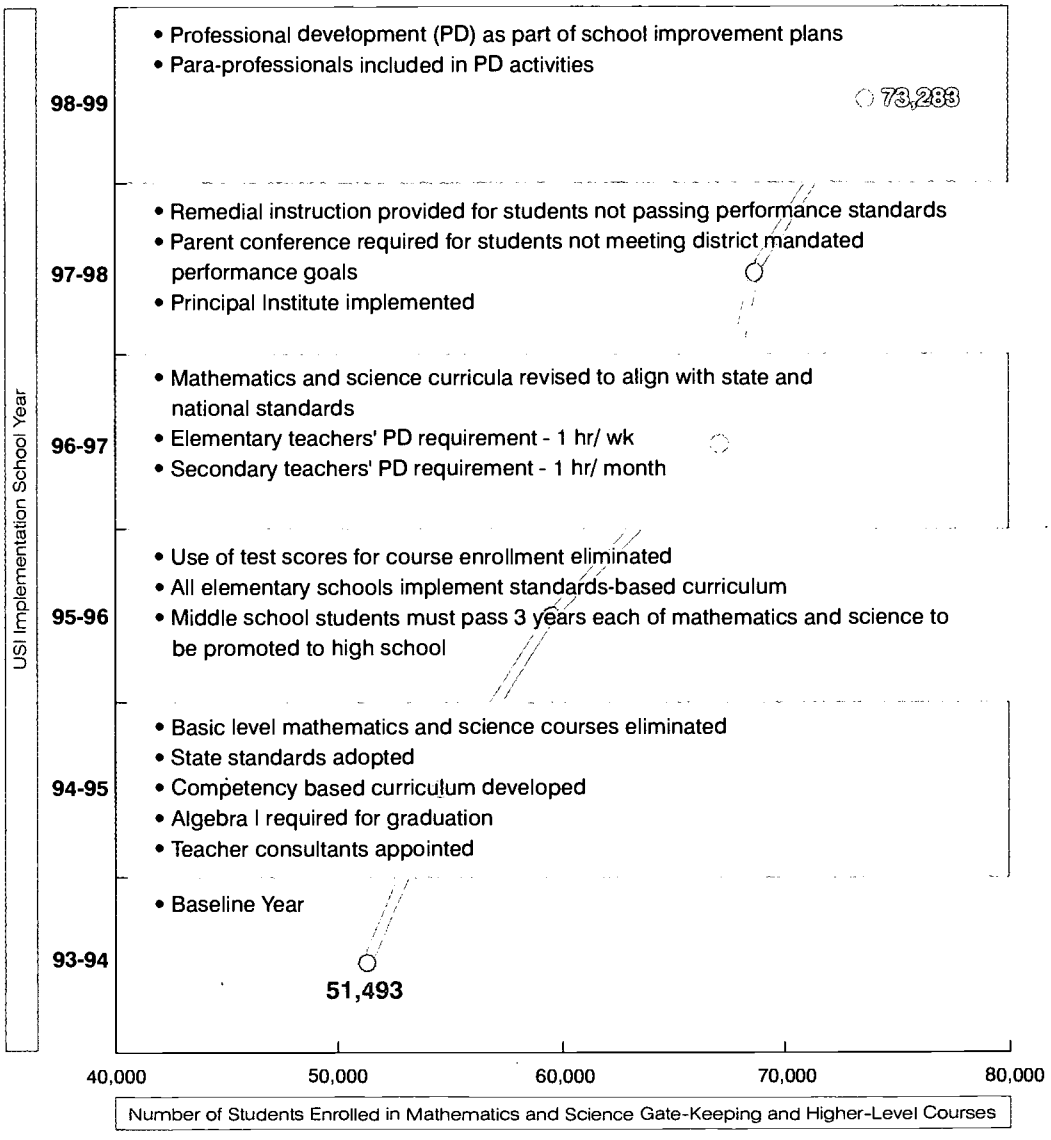
- For science and mathematics, state and district frameworks or standards have the greatest positive influence on curriculum, as well as national standards. Differences between High PD and Low PD teachers were not notable.

> *"Structure of the day has to be changed to accommodate those children. The problem is that some teachers don't have that training. With USI training and the way it has been set up, it allows teachers and students to interact a lot and makes it so much easier. One of the goals of our school system is to align the curriculum with state goals. USI does a good job of doing that."*
>
> – A Principal in a USI school

TIMELINE OF USI IMPLEMENTATION

Each of the USI sites has its own unique implementation plan for changing the educational infrastructure to support improved student achievement in mathematics and science. Exhibit VII presents an example from Miami-Dade illustrating the milestones of its USI implementation from baseline to SY 98-99, along with student enrollment trends in mathematics and science gate-keeping and higher-level courses:

Exhibit VII: Milestones of USI Implementation in Miami-Dade
(Major Policy Changes vs. Enrollment Trends in Mathematics and Science Gate-Keeping and Higher-Level Courses)



"What we can see now as we look back is that we have moved agenda around the curriculum, around how we do professional development. But I think, more meaningfully, we have moved agenda to open up opportunity to kids."

– A USI Project Director

STUDENT ACCOMPLISHMENTS IN MATHEMATICS AND SCIENCE

For the 21 USI sites, the Key Indicator Data System (KIDS) has compiled outcome data that monitors student progress from the USI baseline year to SY 98-99. KIDS is a quantitative (K-1) and qualitative (K-2) annual data collection instrument designed and implemented as a component of the USI evaluative study being conducted by Systemic Research, Inc. Exploratory trend analysis indicate positive impacts of the USI program on students' mathematics and science achievement. The student participation and outcome measures include enrollment in and completion of mathematics and science gate-keeping and higher-level courses, state and district assessment test results, and results from Advanced Placement (AP) tests, the Scholastic Aptitude Test (SAT), and the American College Test (ACT).

IMPROVED MATHEMATICS AND SCIENCE GATE-KEEPING AND HIGHER-LEVEL COURSE ENROLLMENT AND COMPLETION

Urban school students show progress in enrollment and completion of mathematics and science gate-keeping and higher-level courses. These courses include Algebra I or above in eighth grade; and Algebra II, Geometry, Calculus, Integrated Mathematics, Biology, Chemistry, Physics, and Integrated Science in grades 9-12. In general, cohorts with longer durations in the USI program have larger increases in enrollment in mathematics and science than cohorts involved in the program for shorter periods of time. Enrollment increases in mathematics and science are far greater than demographic shifts in these districts.

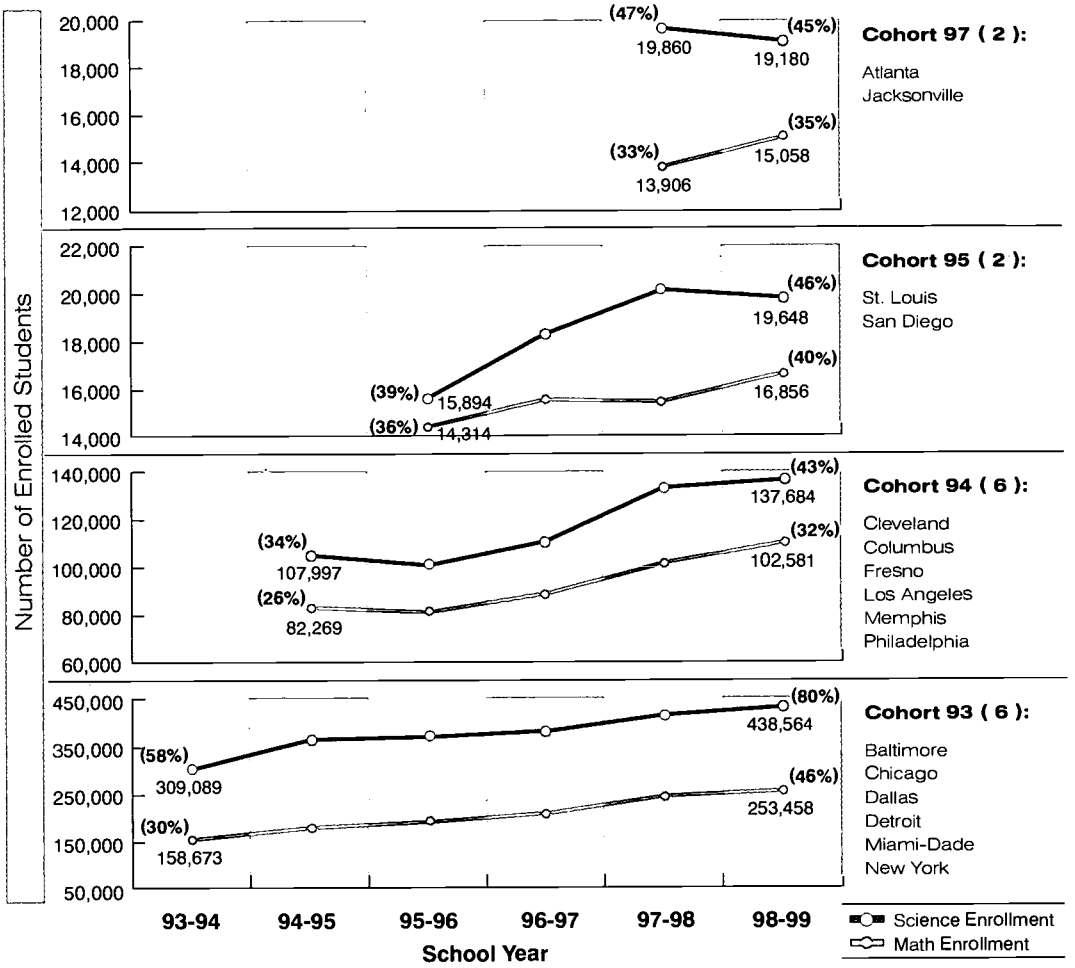
For each cohort, the graphs of Exhibit VIII portray the growth in 9-12th grade enrollment in mathematics and science gate-keeping and higher-level courses. The percentages above the enrollment numbers indicate the percentage of all students who are enrolled in these higher-level mathematics and science courses. For example; in Cohort 93, 158,673 students, or 30% of the total number of 9-12th grade students, were enrolled in gate-keeping and higher-level mathematics courses during SY 93-94. This number increased to 253,458 students which is 46% of that year's total number of 9-12th grade students.

The longest sustaining cohort (Cohort 93) indicates an enrollment increase of 16 % points from the baseline to SY 98-99 in mathematics and a corresponding 22 % points increase in science. The cohorts with later start dates indicate enrollment increases in mathematics of +6 % points, +4 % points, and +2 % points in Cohorts 94, 95, and 97, respectively. The enrollment in science courses increased in Cohorts 94 and 95 from the baseline year to SY 98-99, +9 % points and +7 % points, respectively. Cohort 97 students experienced a -2 % points decrease in science enrollment.

Urban middle school students, including underrepresented minority students, have also experienced increases in Algebra 1 or above in 8th grade course enrollment, as shown in Exhibit IX. In the four Cohort 93 sites with available data (Chicago, Dallas, Detroit, and Miami-Dade) Black students increased their enrollment in Algebra 1 or above in 8th grade from 50 enrollees per 1,000 in SY 93-94 to 79 per 1,000 in SY 98-99, a 58% increase. Hispanic students had an enrollment increase of 59% from 87 per 1,000 to 138 per 1,000, and White students increased their enrollment rate 26% from 170 to 214 per 1,000.

Algebra 1 or above 8th grade enrollment trends in Cohort 94 sites (Cleveland, Columbus, Fresno, Los Angeles, Memphis, and Philadelphia) have shown mixed results. Black students exhibited a remarkable 82% enrollment rate increase from 125 enrollees per 1,000 in SY 94-95 to 228 per 1,000 in SY 98-99, compared to a 10% increase (from 242 to 265 per 1,000) of White students, and a 22% decrease (from 186 to 145 per 1,000) of Hispanic students.

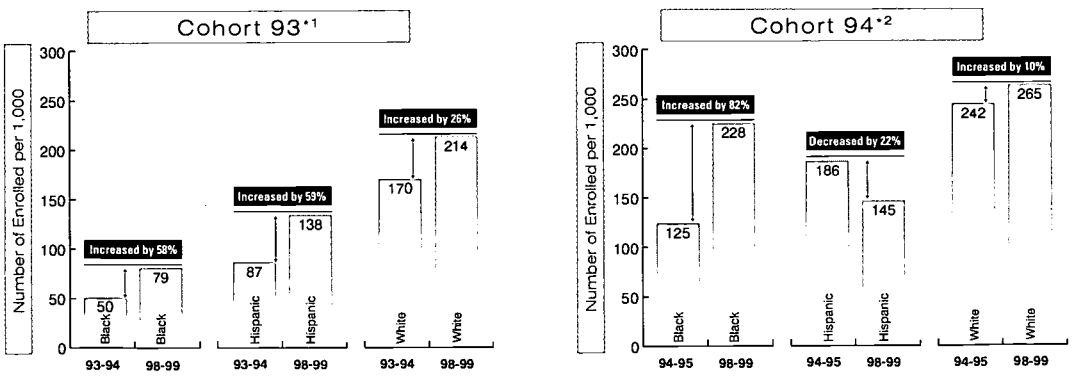
Exhibit VIII: Number of Students Enrolled in Grade 9-12
Gate-Keeping and Higher-Level Mathematics and Science Courses*



Example: During SY 1993-94 in Cohort 93, there were 158,673 students enrolled in mathematics gate-keeping and higher-level courses, which is 30% of the total grade 9-12 student enrollment.

* Math: Algebra II, Geometry, Calculus, Integrated Math II-IV. Science: Biology I, Chemistry I, Physics I, and Integrated Science I-III. (%) Percent of Total Grade 9-12 Enrolled.

Exhibit IX: Number per 1,000 of Total 8th Graders Enrolled in Algebra I or Above by Race/Ethnicity



*1 Cohort 93: Data includes Chicago, Dallas, Detroit, and Miami-Dade

*2 Cohort 94: Data includes Cleveland, Columbus, Fresno, Los Angeles, Memphis, and Philadelphia

The completion rates of students taking gate-keeping and higher-level mathematics and science courses are smaller than the enrollment increases from the baseline to SY 98-99 in most cases. The difference between enrollment and completion rates is expected due to the large increases in total number of students enrolling in these challenging courses. For example, the mathematics enrollment rate increased 62% and the completion rate increased by 50% for Cohort 93 students; the enrollment rate increased 25% and the completion rate 9% for Cohort 94; and the enrollment rate increased 18% and the completion rate 16% for Cohort 95. The mathematics enrollment rate for Cohort 97 students increased 8% and the completion rate 10%. The science completion rates exhibited a similar pattern.

REDUCING ENROLLMENT DISPARITIES

The gate-keeping and higher-level mathematics and science course enrollment rates have increased for all high school students in the USI sites. The rate of increase for underrepresented minority students (Black and Hispanic) has outpaced that of White students, thereby reducing the enrollment disparity.

Exhibits X & XI illustrate increases in course enrollment and decreases in enrollment disparities from SY 93-94 to SY 98-99 for five Cohort 93 sites – Chicago, Dallas, Detroit, Miami-Dade, and New York. Exhibit X compares Black-to-White and Hispanic-to-White enrollment rates for 9-12th grade gate-keeping and higher-level mathematics courses. The enrollment figures are presented as the number enrolled per 1,000 9-12th grade students. In SY 93-94 the Black-to-White enrollment disparity in grade 9-12 mathematics gate-keeping and higher-level courses was 94 students per 1,000. By SY 98-99, this disparity had narrowed to 74 per 1,000 (a 21% decrease) as enrollment rates increased significantly for all students. Similar trends are seen for Hispanic-to-White disparities.

As shown in Exhibit XI, from SY 93-94 to SY 98-99 Black-to-White and Hispanic-to-White enrollment disparities for 9-12th grade gate-keeping and higher-level science courses have also been narrowed. The Black-to-White disparity in science enrollment has been reduced 27.9%, from 183 to 132 science enrollees per 1,000; the Hispanic-to-White disparity has been reduced 38.7%, from 253 to 155.

> *"With the inquiry method for science, one of the hardest things for teachers is to be able to have the children lead and take over. Once you see them doing that, it is awesome-how they are able to go hypothesize, get all the equipment, decide what they want to find out, do the experiment and report back to the class."*
>
> – A teacher in a USI school

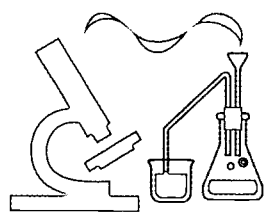
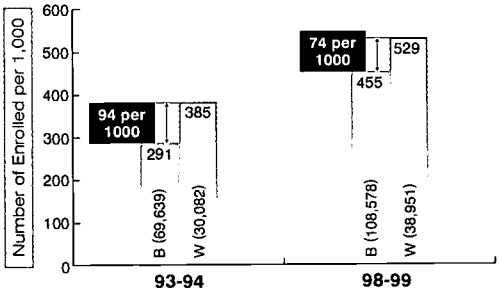
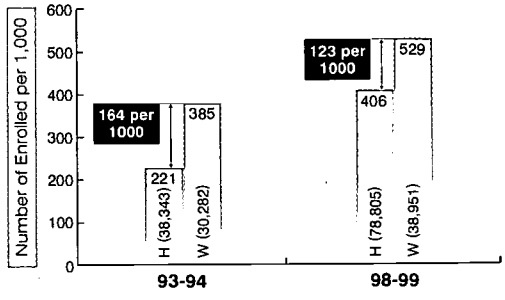


Exhibit X: Reduced Disparity and Increased Enrollment in Grade 9-12 Mathematics Gate-Keeping and Higher-Level Courses*: Number of Students Enrolled in Mathematics per 1,000 Students

Black-to-White Disparity



Hispanic-to-White Disparity

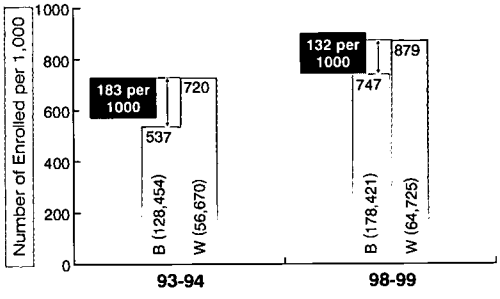


Example: In the SY 93-94, 69,639 Black students enrolled in mathematics gate-keeping and higher-level courses, which represents a rate of 291 per one thousand students. In SY 98-99, the number of black students enrolled in math gate-keeping courses increased to 108,578 (455 per 1,000)

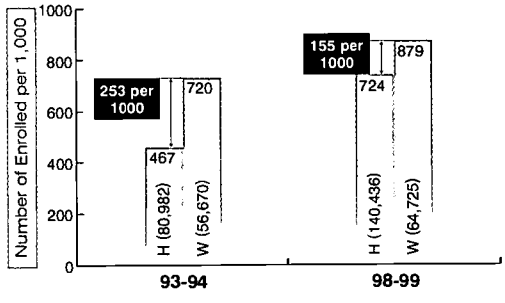
* Includes Algebra II, Geometry, Calculus and Integrated Math II-IV: Data includes Chicago, Dallas, Miami-Dade, and New York

Exhibit XI: Reduced Disparity and Increased Enrollment in Grade 9-12 Science Gate-Keeping and Higher-Level Courses*: Number of Students Enrolled in Science per 1,000 Students

Black-to-White Disparity



Hispanic-to-White Disparity



* Includes Biology I, Chemistry I, Physics I, Integrated Science I-III: Data includes Chicago, Dallas, Detroit, Miami-Dade, and New York

"Our plan is about the issue around equity in our district. It was real clear. The audit said that the most significant issue we have is the equity of results around student achievement, for students between poor and non-poor and between black and white in our district"

– A Superintendent in a USI school district

LINKING QUALITATIVE INDICATORS TO STUDENT PARTICIPATION: A PRELIMINARY APPROACH

Do the policies fostered by the USI program impact students' achievement in mathematics and science course enrollment, as shown in Exhibit VIII? To explore the causal relationships between policies and student outcomes, our evaluative study team developed a template to assign scores to 46 qualitative indicators (policy rubrics) that reflect the drivers of systemic reform. An initial analysis assesses the influence of ten policy rubrics focusing on creating high expectations, promoting equal access, and policies impacting higher-level mathematics and science course enrollment.

Based on the scored rubrics, a statistical method (factor analysis) combined ten policy rubrics into three independent factors: High Expectations (summer school, strict promotion policies, rigorous graduation requirements, and tutoring or Saturday Academy); Equal Access Because All Can Learn (more upper-level courses, high attendance policy, and elimination of tracking); and Sensitivity to Different Learning Styles but with Universal Standards (targeted programs for underrepresented minorities, strategies that address the needs of special populations, and rigorous graduation requirements).

When these three factors are related statistically to the improvement rate of mathematics and science course enrollment, the result is that high expectations and equal access policies have the greatest impact on students' improvement in mathematics and science course enrollment. Sensitivity to Different Learning Styles, while still having a positive effect, makes less of a difference overall.[2]

Our study will continue to explore the impact of the other 36 qualitative indicators that include curriculum and instruction, teacher qualifications, professional development and practices, leadership, partnerships, assessment, and accountability.

ASSESSMENT TEST RESULTS

Exhibit XIII illustrates trends in assessment test results for 8th grade students in mathematics, comparing White students to students that comprise the largest underrepresented minority group in a given district. The 16 USI districts that are represented in the graph administered to their students the same 8th grade test over two or more years. The graph depicts changes in the Minority-to-White gap between the baseline (or earliest available) year and the most recent available year. These data describe changes within a site. Differences between sites in their percentages of students who passed a test are affected by the definition of passing used; consequently, comparisons of the magnitudes of these percentages from one site to another are not meaningful. The length of a bar indicates the gap in the passing rate between White students and the largest underrepresented minority group in a given district.

Each district has its own test and performance benchmarks as indicated in Exhibit XII. In a majority of these sites the passing rate improved in the final year compared with the earlier year, both for Whites (15 of 16 sites experienced gains) and for the largest minority group (15 of 16 sites experienced gains).

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[2] The standardized regression coefficients that assess the impacts of each factor are: 0.230 for High Expectations, 0.168 for Equal Access, and 0.067 for Sensitivity to Different Learning Styles.

In Cohort 93, the longest sustaining cohort, five out of the seven sites have gap reductions. The non-weighted average gap reduction across these seven sites is -6.3 % points, which is greater than the reductions in the other cohorts. In Cohort 94, two of the sites reported gap reductions; the non-weighted average gap narrowed slightly by -2.4 % points. In Cohort 95, one of the four sites reported a reduction; the average change is -3.5 % points. Additionally, the five sites that were predominantly Hispanic had an average reduction in the gap of -8.0 % points, whereas the nine sites that were predominantly Black had a slight average gap increase of +1.0 % points.

Exhibit XIV presents parallel data on the passing rates for 8th grade assessment tests in science for 15 USI districts. Overall, in 14 out of 15 sites, the passing rate is higher in the final year of the comparison than in the earlier year for all students. In Cohort 93, three of the six sites have gap reductions; the non-weighted average gap reduction is -3.9 % points. In Cohort 94, one of the sites reports a gap reduction; the non-weighted average increase in the gaps is +1.0 % points. In Cohort 95, all four sites report reductions; their non-weighted average is -4.8 % points. Once again, the five sites that were predominantly Hispanic had the larger non-weighted average reduction in the gap: -5.6 % points compared to a non-weighted average gap increase of +0.3 % points in the nine predominantly Black sites.

Exhibit XII: 8th Grade Mathematics and Science Assessment Tests and Performance Benchmarks

	Sites	Assessment Tests	Performance Benchmarks			
			Not Passing		Passing*	
Cohort 93	Baltimore	MSPAP	Not Satisfactory		Satisfactory and Above	
	Chicago	ITBS/TAP	Subst. Below	Below Standards	Meets Standards	Exceeds Standards
	Dallas	TAAS	Did Not Meet Minimum Expectations		Met Minimum Expectations	
	Detroit	MEAP	Low/Not Yet Novice	Moderate/Novice		Satisfactory/Proficient
	El Paso	TAAS	Did Not Meet Minimum Expectations		Met Minimum Expectations	
	Miami	SAT 8	4th Quartile	3rd Quartile	2nd Quartile	Top Quartile
	New York	CAT-5	4th Quartile	3rd Quartile	2nd Quartile	1st Quartile
Cohort 94	Cleveland	Ohio Prof. Test	Below Proficient		At or Above Proficiency	
	Columbus	Ohio Prof. Test	Partially Proficient		Proficient	
	Los Angeles	SAT 9	4th Quartile	3rd Quartile	2nd Quartile	Top Quartile
	Memphis	TCAP	4th Quartile	3rd Quartile	2nd Quartile	Top Quartile
	New Orleans	CAT-5/ITBS	4th Quartile	3rd Quartile	2nd Quartile	Top Quartile
Cohort 95	Milwaukee	Terra Nova	Minimum Proficient	Basic	Proficient	Advanced
	St. Louis	MAP	Step 1	Progressing	Near Proficiency	Prof. & Advanced
	San Antonio	TAAS	Did Not Meet Minimum Expectations		Met Minimum Expectations	
	San Diego	SAT 9	4th Quartile	3rd Quartile	2nd Quartile	Top Quartile

* Shaded Green areas represent benchmark categories used to determine passing rates in Exhibit XIII & XIV.

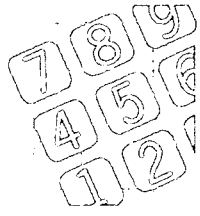
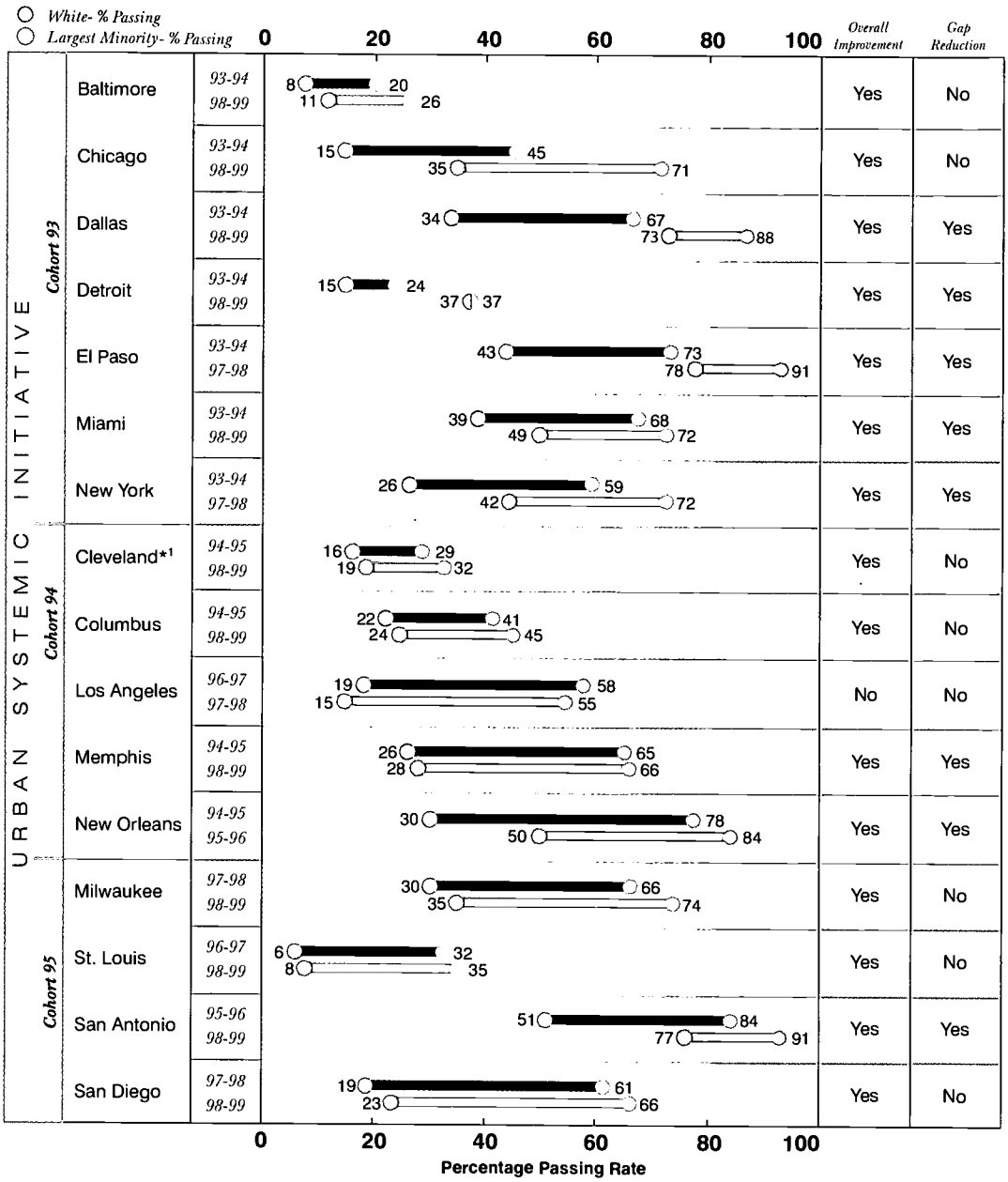


Exhibit XIII: 8th Grade Mathematics Assessment Test Results
Gap Between Passing Rates of Largest Minority Group and White Students

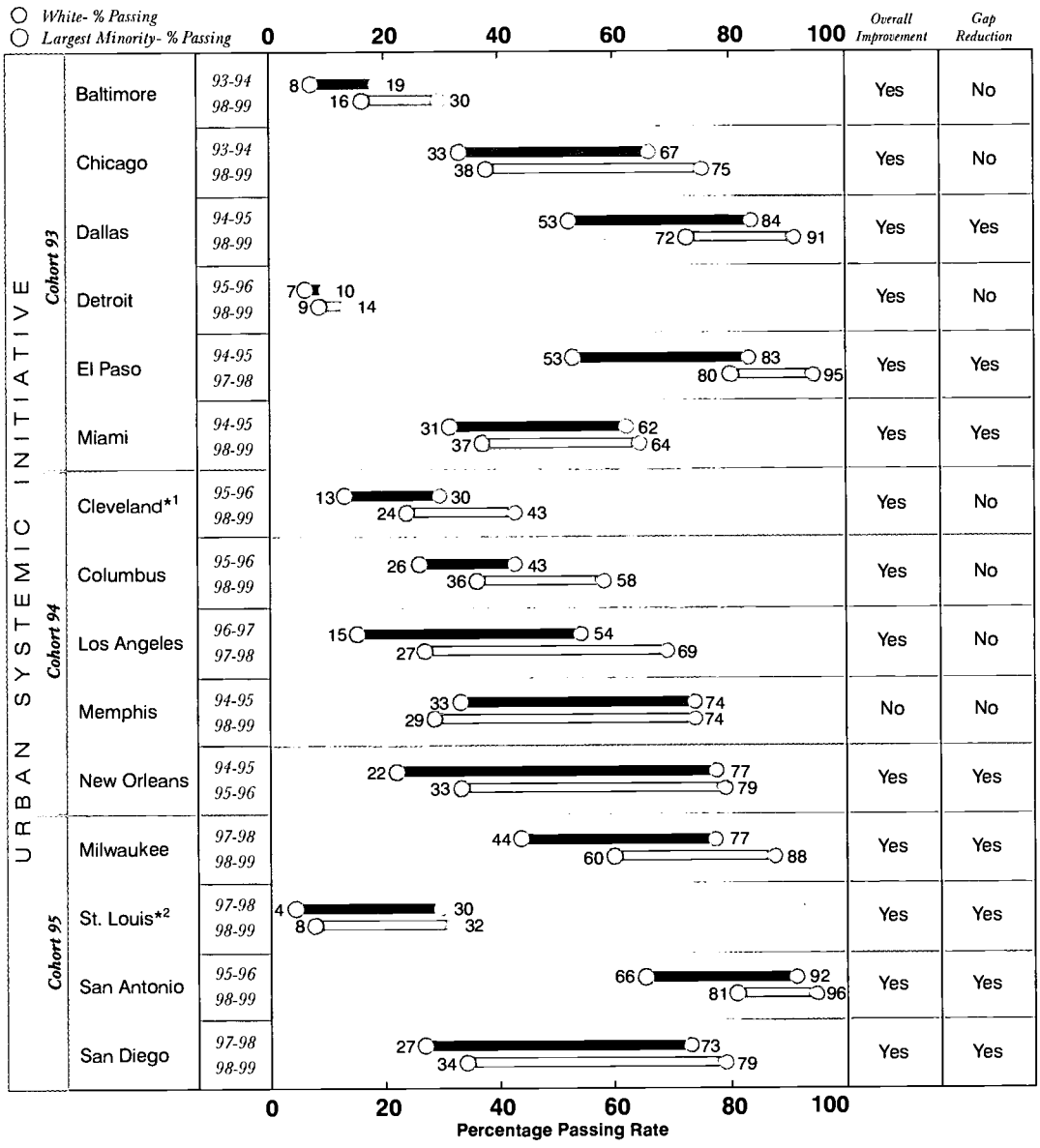


Example: In El Paso, 43% of the largest minority group (Hispanic) and 73% of Whites passed the TAAS in 1993-94; in 1997-98, 78% of Hispanics and 91% of Whites passed the TAAS. Thus the gap between Hispanics and Whites decreased from 30 to 13 percentage points

*1 9th Grade data

Data are not available for Atlanta, Fresno, Jacksonville, Philadelphia, and Phoenix. Blacks comprise the largest minority group in Baltimore, Chicago, Cleveland, Columbus, Detroit, Memphis, Milwaukee, New Orleans, and St. Louis. Hispanics comprise the largest minority group in El Paso, Los Angeles, Miami, San Antonio, and San Diego. In Dallas and New York, both Blacks and Hispanics comprise over 30% of the total student population; the average passing rate between Blacks and Hispanics is provided.

Exhibit XIV: 8th Grade Science Assessment Test Results
Gap Between Passing Rates of Largest Minority Group and White Students



Example: In El Paso, 53% of the largest minority group (Hispanic) and 83% of Whites passed the TAAS in 1994-95; in 1997-98, 80% of Hispanics and 95% of Whites passed the TAAS. Thus the gap between Hispanics and Whites decreased from 30 to 15 percentage points

*1 9th Grade data *2 7th Grade data

Data are not available for Atlanta, Fresno, Jacksonville, New York, Philadelphia, and Phoenix. Blacks comprise the largest minority group in Baltimore, Chicago, Cleveland, Columbus, Detroit, Memphis, Milwaukee, New Orleans, and St. Louis. Hispanics comprise the largest minority group in El Paso, Los Angeles, Miami, San Antonio, and San Diego. In Dallas, both Blacks and Hispanics comprise over 30% of the total student population; the average passing rate of Blacks and Hispanics is provided.

COLLEGE ENTRANCE EXAMINATIONS

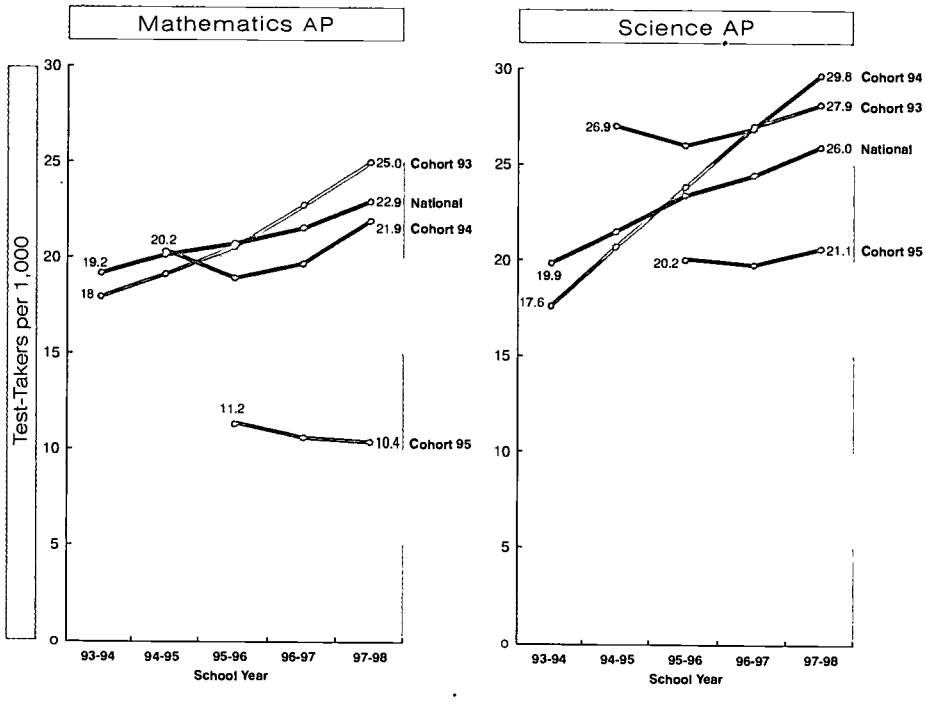
The taking of college entrance examinations, Scholastic Assessment Test (SAT), American College Testing (ACT), or Advanced Placement (AP), is an indication of the students' intent to pursue their education beyond high school. Students in Cohort 93, the longest sustaining USI cohort, show the greatest increase in test-taking rates compared to the remaining three cohorts.

○ AP Mathematics and Science Tests

The sites in Cohort 93 are characterized by greater increases in their rates of AP test taking by 11-12th grade students. The graphs of Exhibit XV illustrate the changes in these rates for all cohorts along with the national trend. For mathematics, Cohort 93 students (four years of USI implementation) increased their test-taking rate by seven more test takers per 1,000, compared to an increase of just 1.7 per 1,000 for Cohort 94 students, and a decrease of -.8 per 1,000 for students in Cohort 95 sites. By SY 97-98 the test-taking rate for Cohort 93 students exceeded the national rate by 2.1 test takers per 1,000.

For science, Cohort 93 students increased their test-taking rate by 10.3 per 1,000, compared to an increase of 2.9 per 1,000 for Cohort 94 students, and to an increase of about 1 per 1,000 for Cohort 95 students. By SY 97-98 the rates for students in Cohort 93 and Cohort 94 exceeded the national rate by 1.9 and 3.8 test takers per 1,000, respectively.

Exhibit XV: Trends in Mathematics and Science Advanced Placement Test Takers per 1,000 11th and 12th Grade Students*



* AP Math tests: Calculus AB and BC. AP Science tests: Biology, Chemistry, and Physics B and C. Based on available AP data for Cohort 93 (Baltimore, Chicago, Dallas, Detroit, El Paso, Miami-Dade, New York, and Phoenix), Cohort 94 (Cleveland, Columbus, Fresno, Los Angeles, Memphis, New Orleans, and Philadelphia) and Cohort 95 (Milwaukee, St. Louis, San Antonio, and San Diego).

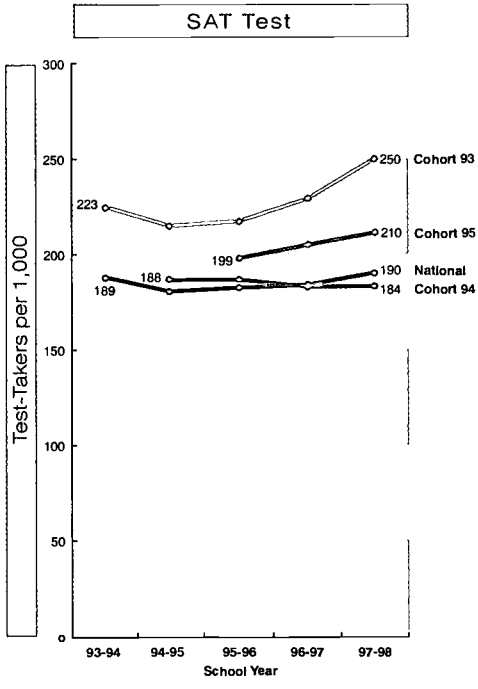
◦ SAT and ACT

Most colleges and universities, as part of their application procedure, require their applicants to take the SAT or the ACT. Exhibit XV illustrates the test-taking rates of those sites whose students predominantly take the SAT; Exhibit XVI shows those sites whose students predominantly take the ACT. Both graphs indicate that Cohort 93 sites have experienced increased rates of SAT and ACT test-taking, compared to the nation, and in most cases, to the later cohorts.

Exhibit XVI depicts how SAT test-taking rates in Cohort 93 increased from 223 per 1,000 11-12th grade students in SY 93-94 to 250 test takers per 1,000 in SY 97-98, an increase of 27 per 1,000. The national trend experienced little change in the same time period. Cohort 94 students had a small decrease of -4 per 1,000 and Cohort 95 students an increase of 11 test takers per 1,000.

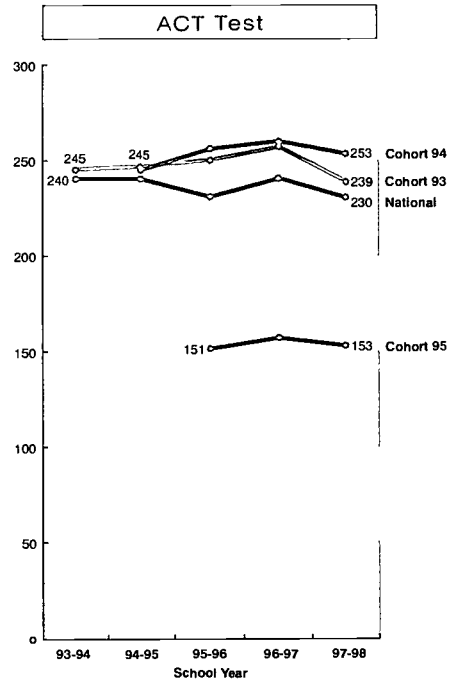
ACT test-taking trends are illustrated in Exhibit XVII. Cohort 93 students experienced a small decrease of -6 test takers per 1,000 between SY 93-94 and SY 97-98 from 245 to 239 per 1,000, compared to the national trend decrease of about -10 test takers per 1,000. However, the test-taking rates increased by 8 per 1,000 for Cohort 94 students and by 2 per 1,000 for Cohort 95 students, from the baseline to SY 97-98.

Exhibit XVI: Rate of Taking SAT Test per 1,000 11th and 12th Grade Students*



* SAT sites are: Cohort 93 (Baltimore, Dallas, El Paso, Miami-Dade, and New York), Cohort 94 (Fresno, Los Angeles, and Philadelphia) and Cohort 95 (San Diego).

Exhibit XVII: Rate of Taking ACT Test per 1,000 11th and 12th Grade Students*



* ACT sites are: Cohort 93 (Chicago and Detroit) Cohort 94 (Cleveland, Columbus, Memphis, and New Orleans) and Cohort 95 (Milwaukee and St. Louis).

TALES FROM EIGHT CITIES - JOURNEYS TO SUCCESS FOR ALL STUDENTS

During the past two years, our evaluative study team conducted eight USI site visits. We met and interviewed numerous educators, administrators, and researchers including superintendents, school board members, USI project directors and their staff, mathematics and science supervisors/coordinators, professional development coordinators, directors for curriculum, instruction, assessment, federal program coordinators, core data managers, evaluators, partners, and parents. We also visited numerous schools to observe classrooms, and to interview principals, mathematics and science teachers, counselors, and students. From the school board to the classroom, we saw evidence of the broad impact of the USI. The USI program, partners, and stakeholders are creating an infrastructure that supports the success of all students. It is not possible to present a comprehensive profile of each site's activities and progress. In their own voice, sites have reported several notable landmarks on their journey to success for all students. Each focuses on different facets of systemic reform.

Baltimore City Public Schools, MD

With the inception of the USI program, the mathematics and science curriculum in Baltimore has been revamped. The curriculum in all grades has been aligned with national standards. Content standards have been developed based on Maryland State Department of Education Standards, Maryland Learning Outcomes, Maryland High School Core Learning and national standards. To support the curriculum, new policies have been adopted: elementary school level science instruction time has been lengthened from one third to a full year, and graduation requirements have been raised to include three years each of mathematics and laboratory science.

Baltimore City Public Schools (BCPS) have formed a primary partnership with Morgan State University (MSU) to administer the USI program. This partnership affords a unique opportunity for the district to influence pre-service teacher preparation because MSU is a major contributor of BCPS teachers,. Mathematics and science professional development in the district is driven by the USI program. Professional development is now focused, comprehensive, and integrated.

Instructional Support Teachers (ISTs) are the bridge between professional development and the classroom. ISTs have received over 200 hours of professional development in content and pedagogy that enable them to coach, mentor, demonstrate, and co-teach. In addition to providing site-based classroom assistance, ISTs present city-wide professional development activities and are involved in grade level planning.

Columbus Public Schools, OH

The USI has adopted a standards-based curriculum aligned with instruction and assessment. Written curriculum guides were improved, "best practices" in instruction were supported, and student assessment test data to guide teaching and learning were used. Reflecting the reality of today's technology driven society, a course in technology and a corresponding internship is a new graduation requirement, beginning with the Class of 2003.

The USI program is the largest provider of mathematics and science professional development in the district. At the school level, the Teacher Support Team (TST) provided classroom assistance, instructional modeling, peer coaching, team collaboration, inservice programs, and data analysis.

Each elementary and middle school has an instructional leadership team consisting of a principal, literacy facilitator, science advocate and mathematics advocate. Along with

the TSTs, mathematics and science advocates are responsible for on-site professional development and teacher assistance at each school.

Columbus USI has established a number of partnerships with: institutions of higher education, informal institutions, commercial providers of professional development, and business/parent/community organizations. A major partner is Ohio State University (OSU), providing pre-service education, professional development for teachers, course design and facilitation, and student centered programs such as the Young Scholars Institute.

Dallas Public Schools, TX

Policy changes directed toward student improvement in science and mathematics have been implemented with the support of the USI program. All secondary students are now required to enroll in both a science and mathematics course each year. Graduation requirements have been increased to include four years of science and mathematics. Algebra IA and IB (non-rigorous Algebra courses) have been eliminated, and seventh and eighth grade mathematics courses have been replaced with Pre-Algebra courses. All DPS staff are required to participate in 36 hours of professional development per year.

The USI program supports the adoption of the Texas Essential Knowledge and Skills (TEKS) state standards in mathematics and science. School-based mathematics and science lead teachers and a leadership team support the implementation of the TEKS based curriculum.

Universities provide professional development for preservice teachers, as well as content training and recertification for current teachers. DPS have also engaged in partnerships with informal institutions (i.e., The Science Place, The Museum of Natural History, The Arboretum, and the Dallas Zoo) to provide professional development supporting the district curriculum framework and national standards.

DPS encourage community partnerships to provide tutoring and mentoring for its students. Tutoring is provided by members of several organizations including The National Association of Black Engineers and the Dallas Alliance for Minorities in Engineering. Tutors and mentors for both teachers and students are also recruited from local universities and businesses.

Detroit Public Schools, MI

The vision of the Detroit Public Schools USI (DUSI) program is that all children will reach their maximum potential as they progress through a challenging and rigorous sequential science and mathematics K- 12 curriculum. DUSI is the driving force behind the science and mathematics reform effort, working with the Michigan Statewide Systemic Initiative.

During the first year of the USI (SY 1994-95) Detroit Public Schools (DPS) implemented a new DPS Core Curriculum, based on state curriculum frameworks, the Michigan Educational Assessment Program (MEAP), NCTM mathematics standards, and NRC science standards. Subsequently, all remedial classes were eliminated in SY 94-95 and graduation requirements were increased from two years of mathematics and science to three years each in SY 96-97. Constructivist instructional practices are now an integral part of core curriculum implementation and professional development offerings.

Partnerships with external institutions play an important role in systemic reform. A priority of DUSI is to involve the community in the schools. There are over 200 partnerships in individual schools. These partnerships provide mentoring, tutoring,

CONCLUSIONS

This report presented evidence of noteworthy gains in student achievement, with the greatest gains seen in school districts that have participated in the USI program for the longest period of time. These advances are accompanied by evidence that urban districts are developing the infrastructure to sustain achievement gains, policies that encourage enrollment in gate-keeping and higher-level mathematics and science courses, strengthened professional development programs, new ways of managing partnerships and resources, and data-driven accountability systems. NSF's Six Drivers of Systemic Reform provided a framework for USI implementation, especially focusing on standards-based curriculum and instruction, policies supporting all students in high quality mathematics and science education, professional development, aligned assessment instruments, convergence of resources, leadership, and partnerships.

Urban students in the 21 USI school districts have dramatically increased their enrollment rates in mathematics and science gate-keeping and higher-level courses. Underrepresented minority students made even greater enrollment gains than their peers during the same period, resulting in reduced enrollment disparities. Assessment test results show that USI students have also made gains in mathematics and science achievement, while reducing achievement gaps among racial and ethnic groups.

The increasing numbers of 11th and 12th grade students taking college entrance examinations indicate more students have aspirations of pursuing post-secondary education. By SY 97-98 Cohort 93 students were taking AP mathematics and science examinations at a rate higher than the national average – a marked increase since 1993-94. Cohort 94 students also follow the same trend. SAT and ACT test-taking rates show a similar pattern. These trends are most notable in the cohorts with the longest participation in the USI program.

USI programs have invested heavily in professional development believing it to be a key lever for improving student outcomes. Seventy-five percent of teachers in the USI sites have participated in professional development to enhance their delivery of mathematics and science education in their classrooms. Our Enacted Curriculum Survey found that teachers with more professional development in standards-based curriculum and instruction report teaching practices that are more consistent with state and national standards than those with lesser amounts.

The infrastructure of partnerships built around each USI site provided strong support for systemic changes based on their unique capacity, resources, and experiences. The partners and school districts interacted as part of a unified effort to promote and support large-scale education reform. Partnerships were formed with interested community members including higher education institutions, corporations, foundations, informal institutions, research centers and laboratories, parents, and other federal/state/local programs.

Education reform is a complex, long-term process that requires simultaneous changes in expectations, policies, curriculum, professional development, student support systems, assessment, data use, and the allocation of resources. The first five years of the USI program have provided a firm foundation of experience and practical wisdom for the second phase of reform – the Urban Systemic Program (USP). As students are exposed to high expectations, a rigorous and engaging curriculum, and better instructional methods, NSF's investment will continue to result in improved outcomes for all urban students. Much has been done; more remains to be accomplished.

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