SUMMARY

A SYSTEM OF SOLUTIONS: Every School, Every Student

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE
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AAAS
ADVANCING SCIENCE, SERVING SOCIETY
A SYSTEM OF SOLUTIONS:
Every School, Every Student

In fall 2004, the GE Foundation posed the following question to a team from the American Association for the Advancement of Science (AAAS) Education and Human Resources Programs: What can be done to support school systems in increasing achievement for all of their students? This brief summarizes the AAAS response.

APPRAOCH

In 1994, the National Science Foundation (NSF) began to fund comprehensive system-wide reform of teaching and learning in competitively-selected U.S. urban public school districts. This AAAS study uses NSF’s Urban Systemic Initiatives (USIs)—and its extension in the Urban System Program (USP)—as the template for assessing how science and mathematics achievement gains might be accomplished in large complex systems (or districts, which we use interchangeably) serving largely minority and disproportionately poor students. Despite the challenges posed by such systems, evaluations within and across them have demonstrated that improvements in student performance indeed occurred, more in some USIs than in others. We ask why. Is there a pattern in marshalling and deploying resources across a school system—beginning with, then spreading beyond, mathematics and science? Do these system-wide practices motivate the successes observed, even as No Child Left Behind (NCLB) has placed new federal requirements and demands on schools and students?

Based on USI evaluation findings, a review of the “systemic reform” literature, and consultations with NSF program officers, the AAAS team selected ten (of the 27) USI/USP districts (see map) that had demonstrated student achievement gains as well as a narrowing of the performance gap between minority and non-minority students. These districts became the targets for interviews to explore and help explain the process of improvement in which they participated (see AAAS Interview Schedule). In all, 24 phone interviews with personnel in key district leadership positions (Superintendent to Project Director) were conducted from October 2004 to January 2005, averaging 90 minutes each. The interviews were organized around six topics derived both from the USI “drivers” and issues emerging from the reform literature we surveyed. Anonymity was promised, so no attributions, by individual or site, appear below.

This primary data-collection was built upon a secondary analysis of the report and journal literature on systemic education reform that extends back to the early 1990s. Exemplary sources are cited at the end of the brief. The findings common to the ten sites were synthesized and identified as critical in supporting sustainable system-wide change. This summary triangulates among informants’ experiences and refines our understanding as distilled in a “short list” of six factors. For elaboration of study findings and lessons, we encourage examination of the longer report at www.aaas.org/ehr/.
Ownership & Accountability

Ownership of student achievement must be “community property.” Informants were emphatic about the need to promote wide stakeholder involvement (“buy-in”) in any and all education reform efforts—school board, other political and community leaders, parents, union, corporate and business leadership, principals, university representatives, teachers, staff and so on. These “neighborhood” resources and organizations must acknowledge problems and propose solutions for discussion and debate across stakeholder groups at all levels. The notion of local ownership carries with it an inherent tolerance for local variation. Accommodating local school culture requires such an allowance as well. So owners are accountable for outcomes—a cascade of responsibility that is collectively held.

Ownership and accountability were cited as vital to every phase of the reform effort: planning, alignment across school levels and, especially, in the selection of the first groups of schools to sign on as “test beds” for any initiative. While the goals and the “drivers” (or design principles, as captured in the interview schedule) of the USIs remained stable, the leadership of districts and schools experienced turnover. New leaders often brought new ideas about models that might be used to raise student performance levels in science and mathematics.

SELECTED URBAN SYSTEMIC INITIATIVES*

- MIAMI-DADE, FL
- ATLANTA, GA
- EL PASO, TX
- HOUSTON, TX
- LOS ANGELES, CA
- PORTLAND, OR
- BROWNSVILLE, TX
- SAN DIEGO, CA
- BOSTON, MA
- COLUMBUS, OH
- MIAMI-DADE, FL
- LOS ANGELES, CA
- SAN DIEGO, CA

*interview sites in this study
A “continuous improvement” challenge to any system is retaining stability of its “vision,” suffusing it from central administration to every classroom, while accommodating variation in strategies employed to achieve it. Sponsor requirements coupled with a stable leadership team can support fidelity to the core vision and goals for the system. A bedrock of design principles should be coupled to a menu of implementation models that are research-based and transparent to district personnel. A failure to gain buy-in and commitment of all stakeholders can be fatal. Ultimately, the community may contribute resources, but moreover, lend political clout and legitimacy that builds and maintains momentum for the sustainability of system improvements in student learning.

**Resources, Notably Time**

One of the key “drivers” of the USI initiative was “convergence of the use of resources in support of science and mathematics education.” While NSF provided funding for the initiative, it was clearly insufficient to support all of the changes that were envisioned. One expectation was that the district would use its own funds differently, that is, in support of the new vision that emerged from the initiative. The other expectation was that community partners would bring additional resources, both people and money, to help support the efforts. There was recognition of the increased “upfront” costs of professional development, improved technology and databases, training associated with new systems, new materials and much more. There were cost savings that came with alignment and efficiency, but also real, continuing costs associated with transformational change.

The main message from the sites was that “transformation is not free”—even with cost savings, additional resources are needed. For example, NSF encouraged the USI sites to become a learning community, to consider “expertise sharing” by corporate partners, and to entertain models that affect classroom practice, such as the use of coaches. These require additional dollars that urban districts do not have.
**Which research-based practices were included in the curriculum frameworks?**

**How did assessments and the accountability system reflect the learning goals outlined in the frameworks? How assessed? What was assessed?**

**Did you align standards, curriculum and materials? What challenges did you encounter?**

**Did you use textbooks? To what extent were research-based curricula used? What was done to determine if textbooks were aligned to national standards and curriculum frameworks?**

**What steps did you take to align professional development of teachers, administrators, and central office personnel with the reform?**

**To what extent did you align instructional practices with research?**

**How did you align as well as make the changes coherent?**

### Implementation

**What roadblocks (barriers) were encountered during the pre-implementation phase? Which did you believe were the most important to overcome before beginning the implementation phase? How did the system overcome these barriers? What helped most to facilitate the smooth progress during the pre-implementation phase?**

**How were groups engaged in understanding the change process?**

**Was the reform implemented by school, by cluster or by other mechanisms? What were the levels? What were the subjects? How chosen? Voluntary or mandated? What percentage of teachers was required? Voluntary or mandated? Why? What approach did you use to implement the reform in all schools? (scale-up)?**

An even more precious resource is time. The experience of the USIs: (1) urges longer periods of planning (up to a year or more) to ensure effective implementation that is faithful to vision and maps system (re)design to action; (2) demands thoughtful partnership/collaboration development that cultivates all stakeholders, no matter how long it takes, to ensure advancement of system goals despite leadership changes; and (3) reminds us (through research) that it takes a long time—3-5 years—to begin changing teachers’ behaviors and routines. One district reworked and re-submitted its plan four times before it was successful in garnering NSF support, using that time to build in the broad base of support that earlier submissions had lacked. The timetable for sustainable reform—policies and practices institutionalized throughout the school district—is more like a decade than a few years.

### Data & Research-based Practices

Successful USIs employed research–based practices, and most included the national standards as a basis for state and/or local standards. Efforts were made to align curriculum (NSF-funded materials in six of the ten sites), professional development, and local assessments; and provide site-based support in the form of teacher leaders/coaches. The challenges to incorporating research-based practice are multifaceted and include: the under-investment in quality education research, especially research related to practice; the lack of knowledge about rigorous research and evaluation that is available and applicable; and the conditions under which certain practices are more/most effective, that is, “what works for whom under what circumstances.”

Data drove the process of reforming science and mathematics education under the USIs. Regular reporting requirements and disaggregation of outcome data, for example, force a level of discipline needed within the project. Discussions
What did schools do differently to organize for the reform?  
To what extent was the collection and analysis of data used to develop strategic plans and to monitor achievement of goals? What was the capacity of the data management system to provide desktop retrieval of data?  
What specific steps have been taken to accelerate the achievement of low-performing students and to close the gap between those performing at the proficient or higher levels and those performing below proficiency? Any resistance from groups?  
What changes in classroom practice have taken place? How was this monitored?  
To what extent did institutions of higher education (IHEs), corporate sponsors, scientists, and mathematicians assist with the reform? What additional resources and technical assistance were useful?  
Was the evaluation done internally, externally, or both? To what extent was the evaluation driven by data?  
Were there other reform efforts taking place at the same time? Explain.  
To what extent did you use site-based management? Has it impeded or facilitated reform?

Professional Development

What was the focus of the professional development for teachers? Who provided it? Multi-year? How many hours? What professional development was provided for other leaders? Other staff? How was the professional development of teachers structured? (Summer? Academic Year? Same offerings throughout the year?)

High Expectations & High Standards

Oft-invoked, yet so difficult to attain, is implementing high standards while manifesting uniformly high expectations. Tying the work of the USIs to national standards effectively raised the bar for the reforming systems. The equity requirement, that is, that the program lead to improving the achievement of all students, including those historically underserved, forced a focus on higher expectations for all. Policy changes within districts often led to abandoning “junk mathematics,” for example, in favor of a requirement that all students complete algebra. This contrasts with earlier, post-A Nation at Risk initiatives, which focused on raising the number of years of mathematics and/or science required for graduation from high school as opposed to specifying concepts (content standards) to be mastered.

Raising standards and expectations must be accompanied by providing assistance—and sometimes a strategy—to teachers to meet these new standards. In parallel, there must be
To what extent did the professional development deepen content and pedagogical knowledge of the curriculum teachers were expected to teach? How did you prepare teachers to respect diversity and to have expectations that all students would achieve?

Was the corporate world included in this effort? How? How were the scientific and mathematics communities involved? IHEs?

What did you do to improve the professional education of administrators? Who were the providers? Over what period of time?

How did you scale up? What needed to be in place in order to scale up?

How were teachers compensated?

To what extent were consultants used to provide services within the school system (central and schools)?

**Assessment and Evaluation**

How did standardized assessments or criterion-referenced tests affect accountability at the school level? At the district level?

How did you monitor and measure implementation of professional development? Were district evaluators used or outside contractors?

How did you monitor and measure changes in classroom practice? What evidence other than teacher self-report was gathered on changes in classroom practice? What tools were used to measure changes in classroom culture?

To what extent were there changes in school culture? System culture? How was this measured?

efforts to build public support as well as a widespread sense of urgency to undertake such change.

**Management & System Capacity**

While most of the USIs were managed within school districts, a few were under the management of a community partner (e.g., a separate non-profit entity much like some of NSF’s earlier program of Statewide Systemic Initiatives). There are advantages and disadvantages to all of these structures. District-based management makes decision making and accountability seamless; it also makes it more vulnerable politically and perhaps more fragile if there has been instability in leadership. Where there has been low public confidence in the district, other structures may need to be considered to reassure the community of a departure from “business as usual.” Regardless of where management responsibilities for the reform initiative might reside, all stakeholders need to be clear about their roles within it and accountability to the partnership. The relationship between district “bureaucracy” and its outside stakeholders may be contentious at first. Eventually, it must become collegial and trusting.

The capacity of the system to manage change exists in its infrastructure. This is more than technology; it encompasses both physical and human resources. As an example, the state of the district’s business functions will affect its ability to implement the reform initiative, from central office to the classroom, school-by-school. The organization of change must incorporate the roles and responsibilities of the participating units, how the elements work individually and as part of the total system. All system components must be aligned and accountable for carrying out their roles in support of the initiative.

USI leaders stressed the alignment of management and organizational practices to support the reform effort. Practices of note include:
To what extent did student achievement improve? How measured?
What assessments were used in science and mathematics?
What data were collected? How analyzed? How shared? How used by administrators? Teachers? Counselors? How accessible?
What tools beyond standardized tests were used to assess student performance?
Was the gap in achievement closed? What was done to close the gap?

Organizational Capacity
How much time was needed to see an increase in achievement? To what extent did the process of systemic reform develop the district’s capacity for reform, self-reflection, re-thinking and learning?
What processes remain in place to ensure renewal?
What guidelines have been established to promote efficient collaborations with business and industry?
How will resources and technical assistance continue?
Which partnerships have made commitments to support the district over time?

• developing complex data systems for tracking progress and using data in decision making;
• developing and implementing strategic plans;
• mapping resource convergence as required by the NSF;
• selecting and procuring equipment;
• designing effective human resources units to identify, hire, orient and support highly qualified staff and faculty;
• marketing the reform initiative; and
• supporting the change process.

These business practices support system-wide reform.

Implementation & Technical Assistance: Going to Scale

A limited number of urban districts were invited to participate in NSF’s USI program. These districts were selected based on common demographic features, such as size and the poverty status of the student populations being served. Based on lessons learned from earlier experiences with state-focused projects, NSF defined a set of design principles, or “drivers,” to guide the development of plans by the sites. The differences in outcomes between more and less successful sites were related to differences in implementation, not design. There are many things that can affect project execution including lack of knowledge and critical skills within the project, turnover in leadership, or inadequate planning or resources, to name a few.

The process by which reforming districts proceeded from the first cohort to the last cohort of adopting schools, or from the test bed to institutionalization, was the area with the weakest base of research and the widest variation of practice. Beyond the admonition to “start with the willing,” many different, but no best, models were observed in practice. There were differences in initial content area (e.g., start with math, start with science or with both math and science), level (e.g., start with middle, or middle and high; start with elementary; start with K-12 volunteer schools; start with feeder patterns; start with lowest-performing schools), and combinations of these. Organizing district level efforts to support improvement in the classroom can take many forms, including identifying, training and deploying especially skilled practitioners as lead teachers, coaches or teachers-on-special-assignment.
Having access to and utilizing technical assistance can make the difference between success and failure in project execution. Advice and assistance on adoption of different project elements can be useful in myriad ways. Examples provided from sites included:

- business functions in the districts and schools (e.g., information systems, budget tracking); and
- programmatic aspects (e.g., professional development models, identification of teacher evaluation instruments), subject content (e.g., standards development, curriculum, assessment, textbooks and courseware).

Ultimately, schools and districts must build internal capacity for improving themselves, be open to professional growth and develop the commitment to do “whatever it takes” to enhance student performance. This means that internal and external help must support, directly and indirectly, the work from the classroom level to the upper reaches of district administration. Community-based intervention is needed to make the school system “go to scale” in achieving not only its teaching and learning goals, but also reaching some semblance of organizational efficiency, adaptability and accountability.

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**A Participant’s View of Systemic Change**

“Leadership, vision, energy, fearlessness and really having the guts to say we are not improving are critical to systemic change. And finding ways and resources for the community-at-large to own the problem is critical.

There has to be an investment of resources and dollars to provide an opportunity to support professional development. Legislators need to remind their constituencies that businesses will not be successful unless they invest in their workforce. At the university level, there has to be consensus about the reality of what an urban school is like and what it takes to bring about change. Businesses and higher education have skills that can help build infrastructure for supporting change.

Medicine is an appropriate model for comparison. Medical professionals continuously reflect on practice, focus on creating wellness, as well as, curing illness. The education community would benefit from a similar continuous focus on instructional practice, promoting achievement for all and appropriately adjusting instruction when needed.

There is a role for various groups in an entire community to reflect on how we anticipate the future, how we get ahead in our thinking and vision, and how we prepare our schools. An entire community can help a district get ahead of the curve.”

*Dr. Patrick Burk, Chief Policy Officer, Oregon State Department of Education
Former Deputy Superintendent of Portland Public Schools

*quoted with permission*
Conclusions: Neither “Magic Bullets” nor “Boiling the Ocean”

The experiences of the surveyed USIs/USPs demonstrate that it is possible to increase student performance in mathematics and science while closing the performance gap that usually characterizes achievement levels of minority and poor students. There are countless stories of individual “turnaround schools” that draw unexpected levels of performance from students in this demographic. What makes this district story exceptional is that the target is not a single school but an entire system. Changing systems requires systemic approaches. Creating a mandate for change can be stimulated by any number of internal or external forces—new leadership, new funding opportunities, political pressure or federal legislation. Picking the right targets, determining the baselines, identifying and recruiting partners and quality people are keys to systems change, as are constant monitoring and adjusting strategies to respond to dynamic circumstances.

The two metaphors above demarcate the extremes of a continuum of change: from the single “magic bullet” meant to solve all problems, to “boiling the ocean,” trying to do everything, and in the process, failing to make strategic choices as to where to invest resources, time and personal capital.

In education reform, we are challenged on all fronts. Three principles are paramount:

**Design**—We must move from the current system of schools to school systems, with clear expectations for district level efforts at coordination and overseeing distribution of services by internal and external actors.

**Measurement**—We must acknowledge (and remedy) the fact that available information is not consistently utilized to guide practice. There is too much emphasis on “keeping score” without attendant focus on developing better measures for the things that are really valued: the knowledge and critical skills students should possess for productive and fulfilling lives as citizens, workers, and role models.

**Implementation**—We must accept that roles and responsibilities are distributed widely across communities. While there must be shared accountability to each other, there is also a requirement to provide the know-how and resources to carry out all roles effectively.

The message from the leaders we interviewed is clear: this work is hard and will take a long time to get it right. It is not cheap. It needs to take place in a climate where failures and mistakes begin to be seen as opportunities to learn and correct. With this in mind, NCLB—like any policy tool—has great potential, both positive and negative, to fundamentally change teaching and learning.

There is some irony in the fact that major efforts at systemic reform were undertaken with populations and districts for whom the public often has the lowest expectations. And yet it anticipates the challenge that America must meet: to provide to the many, from a shifting demographic, the kind of high-level subject matter competence necessary for America’s future.


