

Preview of Findings from RFA's Fall 1999 Data Collection and Analysis: Creating an Infrastructure for Sustaining Math and Science Reform in Philadelphia

The purpose of this analysis is to begin providing an overview of the large-scale sustainable, systemic changes in math and science of which the Philadelphia USI has been a part and to which it has contributed substantially. This analysis is based primarily on key informant interviews conducted during November and December 1999 and on the analysis of CPRE survey data made available during the fall of 1999.

RFA's current analysis suggests that the Philadelphia school district has a substantial infrastructure for sustaining improvement in math and science in Philadelphia, but also faces challenges that have the potential to be addressed through continued NSF support. Resources and funding provided through the Urban Systemic Initiative have been critical to maintaining the visibility and viability of math and science improvement in the district over the past five years.

Particular areas of strength have been:

- Central Office guidance systems and supports to enhance student achievement in math and science.

USI is an integral part of the broader Children Achieving Agenda. The Children Achieving Agenda creates the context in which USI intertwines with other Central Office departments and initiatives. This is particularly true of USI's relationship with the Office of Curriculum Support with which USI shares several staff members. Although the initiatives coming out of the two offices are not identical, the directors of Curriculum Support and USI have worked closely to align their efforts.

As one informant reports, when the new superintendent came, he made it clear that all initiatives in the district had to support Children Achieving. This informant summarizes several fundamental ways in which USI was able to support and interact with other district-wide initiatives. "There was a huge press for high expectations that all students would learn, a huge press for ongoing systemic, deeply embedded professional development. The upgrading of curriculum which was translated into curriculum frameworks. The revision of assessment, first in selecting the SAT 9...more recently with the proficiency exams."

Other key informants echo these themes; they report that USI has contributed to the accountability system, the curriculum frameworks and standards, changes in course requirements and course sequencing, and technological innovations as contributing to changes in math and science teaching and learning within the School District of Philadelphia.

The theme related to Central Office initiatives which appears the strongest in the key informant interviews is the SAT 9 test's role in increasing teachers' and administrators' awareness of the need for problem-solving and conceptual approaches in teaching math and science. The informants also mention that science has become part of the school district's accountability system because of USI and that USI has played a major role in providing materials, professional development, and supporting teachers to meet the demands of the new assessments. Please see Appendix A for a fuller discussion of informants' beliefs about the value of the SAT 9 test and how it is impacting teaching and learning in Philadelphia.

Not mentioned universally, but still a strong theme in informants beliefs about how USI relates to other Central Office guidance systems and supports is the role that USI staff and leaders have played in creating local standards and curriculum frameworks that reflect the national standards. As one outside partner reports, these standards and frameworks are contributing to the slowly growing consensus about what math and science teaching and learning should look like in the school district of Philadelphia. According to this informant, "The NCTM standards are extremely helpful nationally and locally. The parallel set of science standards, although it came later is also helpful. If you go back to when those standards were being set, I remember when [a local elementary school teacher], was a member of the 2061 group that was setting those standards. The leadership in both USI and the Office of Curriculum Support were extremely knowledgeable about those national standards and helpful in formulating them. So, to the degree that the Philadelphia curriculum frameworks are slowly becoming embedded in the ongoing work of teachers, so are in fact are the national math and science standards.

Key informants also mentioned USI and the Office of Curriculum Support's joint contribution to changes in course requirements and sequencing at the high school level. In particular, several informants referred to the district's new requirement that all 9th grade students have to take algebra. These informants also pointed out the resources and programs made available through USI to help middle and elementary school teachers prepare students adequately to enter college prep. In addition, several informants were excited about proposed changes in the sequence and content of high school science courses such as offering physics to 9th graders or developing a sequence of science courses that would integrate physics, biology, chemistry, and earth science.

The final area of strength at the Central Office level mentioned by key informants was in the area of technical innovations. Although only a few key informants discussed this change, we believe that it is important to recognize that technology was another area in which USI contributed to the Central Office infrastructure. In particular, key informants mentioned the value of regular email updates about activities and opportunities for students and teachers, the availability of curriculum frameworks on CD rom, and a T.V. show produced by one of the staff.

- The second major area of strength mentioned by key informants is the development of human capital through professional development in math and science content and pedagogy.

USI's role in developing human capital in the district is strongly supported by data from teacher surveys conducted during the Spring of 1999 and by RFA's collection of data about participation in professional development. []. In addition, content institutes, also developed and run by USI and Office of Curriculum Support staff and USI teacher-leaders, attracted _____.

USI has offered multiple opportunities for individual teachers to participate in professional development activities, key informants also almost unanimously note that USI participants have also become the backbone of a district-wide leadership network in bringing knowledge about the national changes in math and science to Philadelphia. The USI built on and strengthened pre-existing networks of teacher-leaders in math and science and was based on a model in which every schools was expected to have teacher-leaders in math and science who would receive intensive training, do turn-around training for colleagues at his or her school, and bring a high level of knowledge about math and science pedagogy, programs, and materials back to the school level.

Key informants point out that school-level leadership among USI teacher-leaders is problematic for many reasons. Nevertheless, most key informants recognize the value and viability of this network. Data provided by key informants seems to suggest that there is an informal network which connects classroom teachers, principals, TLN facilitators, and Central Office staff and enable them to share knowledge and skills about how to make things happen within the district at the same that it shares information about math and science content, pedagogy, and resources.

Our biggest point of intersection [with USI] is our lead chief curriculum coach and from the start she has been deeply involved with USI...What helps [in coordinating with the School District of Philadelphia] is that I use as much as possible the curriculum coaches who are school district teachers on special assignment. It not only builds up capacity and sustains retention in the district but gives us insider knowledge. Our lead chief curriculum coach knows everybody. She can go to the school district and have an informal meeting in the hallway and she carries more trust than someone working outside the system.

First, teacher-leaders have played and are continuing to play an important role in developing and revising the district's curriculum frameworks. According to one informant, "As the teacher-leaders and the other leadership initiatives that USI was so embedded in, got stronger and stronger, those people began to cross over directly into the Children Achieving Agenda's work, like the development of curriculum frameworks." A person involved in the current revision of the curriculum frameworks said the same thing, describing, the people in the

mathematics community who are knowledgeable about what is happening in schools are “USI leaders or have been content leaders, or they teach particular courses in the professional development, in each of the content areas.”

Second, outside partners and TLN facilitators report that they build on and strengthen the work of USI teacher leaders. One outside partner reported that they enhance their work on whole-school change by working with the existing teacher-leaders. "in the schools that have effective program like Math in Context or Mathscape we've built support for it with teachers who had been developed by USI." . In many cases we tapped USI leaders for ongoing professional development. USI's teacher leader at [one school] is also our expert and she has lead 5 or 6 monthly staff development meetings. We have made use of the trainings she received from USI and development meetings. It has been a natural collaboration. Other teachers are also USI leaders. Our teachers also make use of the effective programs trainings on Saturday offered by USI if they can't come to ours."

I've supported USI pd when I could. In our cluster we continue to have meetings with the USI teachers. I also work with schools when creating school improvement plans. I make sure the goals developed in math and science are achievable and address the data. In a lot of situations I continue to help schools realize their USI teacher leader is the key person they could use to help

Facilitators really look at what we are planning, how we want to involve students, what we expect students to do and keep the USI teacher leaders aware that they are leaders and to be proactive. Teacher leaders are supposed to share with the other teachers in the school, giving out information, and collaborating with them, answering questions and concerns in the areas of math and science and keep that focus.

- Widespread dissemination of NSF-approved effective programs in math and science.
 - Development of a leadership network supported through USI activities.
 - Consolidation and growth of relationships between the School District of Philadelphia and outside partners.

Continued NSF support would allow the School District of Philadelphia to build on the strength of current reform efforts and meet current challenges.

Research for Action's current analysis suggests the following needs:

- Greater degree of strategic planning, articulation, and monitoring of elements of systemic change.
- Refinement of the Philadelphia Curriculum Frameworks (While we know that this is currently occurring, we include it here because questions about the need for a more structured and/or more detailed curriculum were a big concern among key informants during our November and December interviews)
- Increased number and stability of staff knowledgeable in math and science content at the middle school level.
- Increased depth of content knowledge and pedagogical skill at all levels.
- Broader understanding about the process of curricular and pedagogical reform in math and science among people in leadership positions including cluster leaders, principals, high school chairs, and cluster facilitators.

We believe that this analysis, although not yet completely finished, has the following implications for the proposal for the Urban Systemic Program:

- Philadelphia USI can make a strong argument that it is building on its existing work as the math and science arm of Children Achieving

USI has had close coordination with other staff at the Central Office and the clusters. USI staff time has been structured around many Children Achieving initiatives and the program demonstrates philosophical alignment with Children Achieving.

- Philadelphia USI can make a strong case for building on existing partnerships with universities to strengthen pre-service, in-service, and advanced degree programs for Philadelphia teachers.

Key informants in our sample outside partnerships (the University of Pennsylvania, Temple University, the Franklin Institute, La Salle, and John Hopkins) describe the strength, depth, and value of their personal and programmatic relationships with USI. The strong relationship with outside partners is also described by many key informants within the district.

- Philadelphia USI can make a strong case that it has strengthened the human and social capital necessary for sustaining math and science reform in the district.

By human capital, we refer to the increased knowledge and skills of individual teachers through professional development and familiarity with Effective

Programs. By social capital, we refer to the strong network of relationships among individuals inside and outside the district who are committed to improving math and science teaching and learning in the School District of Philadelphia.

- Principals and cluster leaders should be brought explicitly into the ongoing reform initiative.

Many key informants express a concern about the need for monitoring, oversight, and coordination within Philadelphia's math and science reform effort. One way of addressing this concern would be to define the role and responsibilities of principals in facilitating the whole school change process in math and science. Outside partners can be a valuable resource for providing professional development and support to principals. This could include help with school-based planning for phasing in new math and science programs, analyzing specific needs for professional development for current teachers within a specific school, and coordinating school-based support systems for pre-service teachers and new teachers. In addition, outside partners may be positioned to work effectively with cluster leaders on cluster-wide planning and coordination of math and science initiatives.

- The School District Department of Human Resources can also be brought into the planning process for USP.

This office has expanded its staff and is currently prioritizing recruiting middle school teachers, and especially people qualified to teach math and science. The director of this office has extensive knowledge about challenges and possible supports for new teachers and is in the process of strategizing ways to reach out to and maintain qualified teachers. The Department of Human Resources could also refine its recruiting strategies to build on USI's knowledge and contact with local colleges and universities.

- Throughout the process of planning and implementing the USP, attention should be given to articulating and understanding the various roles of principals, outside partners, Central Office staff, teacher-leaders, and others.

All the players should be able to see themselves as part of a bigger picture which is evolving, but which is also coherent and coordinated. Understanding the bigger picture of math and science reform as it conceptualized in the School District of Philadelphia will help clarify the roles of people positioned at different levels and at different places inside and outside the system.

Outline of Proposed Report: Winter 2000

I. Introduction

- **Overview of USI and how it fits in with Children Achieving's Theory of Action.**
- **Methodology.**
The current analysis of infrastructure draws heavily data collected and analyzed this fall and winter including key-informant interviews, our analysis of district-wide teacher survey results, and the study of professional development participation, but it is informed by four years of previous research. This section will describe RFA's methodology over time, including school-case studies, observations of professional development, key informant interviews, document analysis, and analysis of district-wide surveys. Data from case-studies, student-achievement, and teacher-surveys will be integrated in our final report

II: Current Infrastructure to Support Ongoing Math and Science Reform

A. Central Office Policy Guidance and Supports

- The Accountability System.
- Curriculum Frameworks and Standards
- Changes in Course Requirements and Sequencing
- Technological Innovations

B. Development of Human Capital through Professional Development, Dissemination of NSF Approved Effective Programs, and Leadership Activities

- Widespread participation by classroom teachers in USI professional development and math and science content institutes. The extent of participation in professional development is strongly supported by data from the teacher-survey and by RFA's collection of data about district-wide participation in professional development.
- Smaller numbers of classroom teachers participate in leadership network and provide resources for activities like developing curriculum frameworks, facilitating workshops, and choosing materials.
- Pattern of USI teacher-leaders moving into other leadership positions in schools and district. Key informants consistently note that USI has helped to develop a leadership cadre which provides resources for district initiatives like the development of curriculum frameworks, but there is some concern that teacher-leader model is weakened when teacher-leaders move out of the classroom.

C. Consolidation and Growth of Relationships with Outside Partners

- Development over time of institutional relationships between the school district and local universities and museums.
- Extensive provision by outside partners of credit and noncredit courses, workshops, and on-site coaching in math and science content, pedagogy, and use of Effective Programs for classroom teachers.

III. Additional Infrastructure Needs

A. Strategic Planning and Articulation of Systemic Elements of Change

- Currently teachers and administrators in Philadelphia are overwhelmed by the pace and number of reform initiatives expected by Children Achieving.
- Cluster leaders, principals, department heads, and others in leadership positions need clearly identified roles in the process of professional development, long-term planning for curricular reform, and instructional improvement.
- Partners and personnel outside of USI's immediate network need an opportunity to develop a holistic view of math and science reform in Philadelphia. Stakeholder need to be able to see themselves as part of a larger whole or perceive their place in a strategic vision that weaves together curriculum, materials, professional development, and community involvement.

B. Refinement of Philadelphia Curriculum

- Many key informants express a need for more clearly defined and structured districtwide curricular goals in math and science.

C. Human resources

- Increased staffing at schools, especially at middle schools.
- Increased depth of knowledge of classroom teachers. Elementary teachers have limited math and science content knowledge. Middle schools have few content area specialists. High school teachers are not current in content or pedagogical knowledge. Key informants agree that currently math and science reform is broad, but not deep. There is a general consensus that classroom teachers need additional content knowledge and skill with inquiry and conceptual learning.
- Increased knowledge among principals, high school chair people, cluster leaders, and cluster support people about math and science reform. People in leadership positions need information about current trends in math and science instruction

and curriculum. They also need to develop knowledge about their roles as leaders within a challenging change process.

IV. Implications for the Urban Systemic Program

A. Philadelphia USI can make a strong argument that it is building on its existing work as the math and science arm of Children Achieving

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B. Philadelphia USI can make a strong case for building on existing partnerships with universities to strengthen pre-service, in-service, and advanced degree programs for Philadelphia teachers.

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C. Philadelphia USI can make a strong case that it has strengthened the human and social capital necessary for sustaining math and science reform in the district.

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D. Principals and cluster leaders should be brought explicitly into the ongoing reform initiative.

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teachers. In addition, outside partners may be positioned to work effectively with cluster leaders on cluster-wide planning and coordination of math and science initiatives.

E. The School District Department of Human Resources can also be brought into the planning process for USP.

- This office has expanded its staff and is currently prioritizing recruiting middle school teachers, and especially people qualified to teach math and science. The director of this office has extensive knowledge about challenges and possible supports for new teachers and is in the process of strategizing ways to reach out to and maintain qualified teachers. The Department of Human Resources could also refine its recruiting strategies to build on USI's knowledge and contact with local colleges and universities.

F. Throughout the process of planning and implementing the USP, attention should be given to articulating and understanding the various roles of principals, outside partners, Central Office staff, teacher-leaders, and others.

- All the players should be able to see themselves as part of a bigger picture which is evolving, but which is also coherent and coordinated. Understanding the bigger picture of math and science reform as it conceptualized in the School District of Philadelphia will help clarify the roles of people positioned at different levels and at different places inside and outside the system.