CORE QUESTIONS and REPORT TEMPLATE
for
FY 2004 NSF COMMITTEE OF VISITOR (COV) REVIEWS

Guidance to NSF Staff: This document includes the FY 2004 set of Core Questions and the COV Report Template for use by NSF staff when preparing and conducting COVs during FY 2004. Specific guidance for NSF staff describing the COV review process is described in Subchapter 300-Committee of Visitors Reviews (NSF Manual 1, Section VIII) that can be obtained at http://www.inside.nsf.gov/od/gpra/.

NSF relies on the judgment of external experts to maintain high standards of program management, to provide advice for continuous improvement of NSF performance, and to ensure openness to the research and education community served by the Foundation. Committee of Visitor (COV) reviews provide NSF with external expert judgments in two areas: (1) assessments of the quality and integrity of program operations and program-level technical and managerial matters pertaining to proposal decisions; and (2) comments on how the outputs and outcomes generated by awardees have contributed to the attainment of NSF's mission and strategic outcome goals.

Many of the Core Questions are derived from NSF performance goals and apply to the portfolio of activities represented in the program(s) under review. The program(s) under review may include several subactivities as well as NSF-wide activities. The directorate or division may instruct the COV to provide answers addressing a cluster or group of programs – a portfolio of activities integrated as a whole – or to provide answers specific to the sub-activities of the program, with the latter requiring more time but providing more detailed information.

The Division or Directorate may choose to add questions relevant to the activities under review. NSF staff should work with the COV members in advance of the meeting to provide them with the report template, organized background materials, and to identify questions/goals that apply to the program(s) under review.

Guidance to the COV: The COV report should provide a balanced assessment of NSF's performance in two primary areas: (A) the integrity and efficiency of the ***processes*** related to proposal review; and (B) the quality of the ***results*** of NSF's investments in the form of outputs and outcomes that appear over time. The COV also explores the relationships between award decisions and program/NSF-wide goals in order to determine the likelihood that the portfolio will lead to the desired results in the future. Discussions leading to answers for Part A of the Core Questions will require study of confidential material such as declined proposals and reviewer comments. *COV reports should not contain confidential material or specific information about declined proposals.* Discussions leading to answers for Part B of the Core Questions will involve study of non-confidential material such as results of NSF-funded projects. It is important to recognize that the reports generated by COVs are used in assessing agency progress in order to meet government-wide performance reporting requirements, and are made available to the public. Since material from COV reports is used in NSF performance reports, the COV report may be subject to an audit.

We encourage COV members to provide comments to NSF on how to improve in all areas, as well as suggestions for the COV process, format, and questions.

FY 2004 REPORT TEMPLATE FOR
NSF COMMITTEES OF VISITORS (COVs)

Date of COV August 25-27
Program/Cluster: USP
Division: ESIE
Directorate: EHR
Number of actions reviewed by COV[1][1]**: Awards: Declinations: Other:**
Total number of actions within Program/Cluster/Division during period being reviewed by COV[2][2]**: Awards: Declinations: Other:**
Manner in which reviewed actions were selected: Random

PART A. INTEGRITY AND EFFICIENCY OF THE PROGRAM'S PROCESSES AND MANAGEMENT

Briefly discuss and provide comments for *each* relevant aspect of the program's review process and management. Comments should be based on a review of proposal actions (awards, declinations, and withdrawals) that were *completed within the past three fiscal years*. Provide comments for *each* program being reviewed and for those questions that are relevant to the program under review. Quantitative information may be required for some questions. Constructive comments noting areas in need of improvement are encouraged. Please do not take time to answer questions if they do not apply to the program.

A.1 Questions about the quality and effectiveness of the program's use of merit review procedures. Provide comments in the space below the question**.** Discuss areas of concern in the space provided.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	**Yes, No, Data not available, or Not applicable**
A.1.1 Is the review mechanism appropriate? (panels, ad hoc reviews, site visits) Comments: The panel process, including reviews and site visits, was an appropriate process for the USP. As the program evolved, there were substantive changes that took place with regard to technology (FastLane) and review criteria (mandating Intellectual Merit and Broader Impact) that improved the quality of the review process. As demonstrated through the data that was available and the summary explanation that was provided, what was described as a three-stage review process was consistently performed across all three cohorts.	Yes

Issues/concerns The jackets for districts that received declinations in cohort I had already been archived and therefore were unavailable for review.	
A.1.2 Is the review process efficient and effective? Comments: The efficiency of the merit review process can be looked at from two different perspectives: organization and resource utilization. Across the three cohorts, there is organizational consistency in taking corrective action to make the process better in response to short-comings noted either through internal or external evaluation. The adherence to timelines (with the majority of accepted proposals coming to completion and award within 6 months) is noteworthy. It was clearly stated that all proposals that exceeded the 10 million dollar threshold had to go to DRB action. The panel process, made much better by improvements in FastLane, is an efficient resource as demonstrated by the ability to compile data and produce reports based on electronic submission. Issues/concerns 1. Although the three-stage review process was in place, it was not clear why decisions were made for site-visits and the reasons for on-site versus reverse site visits. 2. All sites that were funded received questions but all did not receive site-visits (across all cohorts), therefore, it would seem that stage two is actually two separate stages. Either all sites that have questions need to have a site visit or the site visits need to be described as stage three. 3. It is not clear which type of site visit is the most effective or efficient based on the available data.	Yes
A.1.3 Are reviews consistent with priorities and criteria stated in the program's solicitations, announcements, and guidelines? Comments: Consistency in the numbers improves from cohort I to cohort III. Lack of consistency in cohorts I and II seemed to have been corrected. Jackets are in chronological order, well organized, and include relevant historical documentation. Jackets include documentation for components such as site visits, review panels, PERs, and correspondence. The components of the review process provided feedback and guidance, thereby providing an opportunity for substantive improvement. Mid-point reviews, PERs, and site visits appeared to be an essential and integral component.	No for cohorts I and II: However, numbers are consistent with priorities across the three cohorts
A.1.4 Do the individual reviews (either mail or panel) provide sufficient information for the principal investigator(s) to understand the basis for the reviewer's recommendation?	Yes (for reviews available)

Comments: A subcontractor compiled data tables concerning sufficiency of information. About half of cohort I and II reviews were available—all of them were deemed sufficient by the contractor. All but 3 sets of cohort III individual reviews were available—all deemed sufficient. A random check of jackets for individual reviews as well as a discussion with the contractor raised concerns whether instructions to reviewers are complete enough to provide reviews that respond to NSF's two criteria.	
A.1.5 Do the panel summaries provide sufficient information for the principal investigator(s) to understand the basis for the panel recommendation? Comments: Review of a random sample of panel summaries indicated to COV panelists that summaries contained rich and detailed information. A third party review of all available materials indicated that the summaries were sufficient for all proposal jackets.	Yes (for cohort III)
A.1.6 Is the documentation for recommendations complete, and does the program officer provide sufficient information and justification for her/his recommendation? Comments: A random sample of Form 7s completed by the program officer indicated that they were very thorough and detailed. All Form 7s available were judged by a third party review to be complete and to justify the recommendations.	Yes (for those that were available)
A.1.7 Is the time to decision appropriate? Comments: The majority of projects reached decision within six months. This is commendable considering the size, scope, and high-risk nature of these awards.	Yes (extremely good record)

Discuss issues identified by the COV concerning the quality and effectiveness of the program's use of merit review procedures:

1. The USP made good use of the merit review process. Most indicators show that in each successive version of the announcement and review procedure, efforts were made to ensure that the integrity of the merit review process was maintained.
2. The jackets contain the complete history of each proposal and can easily be reviewed in order to support decisions that were made.
3. The lack of congruence between individual and panel reviews and the two NSF merit review criteria raised concern, not because of the apparent gap, but because the merit review criteria are so rigid.

A.2 Questions concerning the implementation of the NSF Merit Review Criteria (intellectual merit and broader impacts) by reviewers and program officers. Provide comments in the space below the

question. Discuss issues or concerns in the space provided.

IMPLEMENTATION OF NSF MERIT REVIEW CRITERIA	**Yes, No, Data Not Available, or Not applicable**
A.2.1 Have the individual reviews (either mail or panel) addressed whether the proposal contributes to both merit review criteria? Comments: Based on a review of a random sample of jackets from all three cohorts, it is evident that the merit review criteria were not clearly addressed in many of the individual reviews. Reviews often focused on program-specific questions and criteria. Reviews often included strengths and weaknesses, but the merit review criteria were usually omitted. A third party review demonstrated that there are areas of the merit review criteria that were rarely addressed in individual reviews and therefore not addressed in panel summaries. These include "suggested & explore creative and original concepts" and "disseminate results broadly." A review format that clearly delineates the merit review criteria as well as program specific criteria would alleviate this discrepancy.	Yes
A.2.2 Have the panel summary reviews addressed whether the proposal contributes to both merit review criteria? Comments: Based on a review of a random sample of jackets from all three cohorts, it is evident that the merit review criteria often were not clearly addressed in the panel summaries. There were some jackets that had headings and summary data for the two criteria but they were not uniform in addressing each area. Through interviews with the program staff, it was ascertained that the mandate to adhere to merit review criteria was not part of the initial review process. A third party review clearly demonstrated that there were parts of the merit review criteria that were rarely addressed in individual or panel summaries.	Yes
A.2.3 Have the *review analyses* (Form 7s) addressed whether the proposal contributes to both merit review criteria? Comments: A review of these forms demonstrates that the merit review criteria were not explicitly addressed. The issues that were covered in the review analyses are	Yes

program specific and important for feedback that would guide districts in being successful in program implementation. From a thorough analysis of the documents, you can find where components of the merit review criteria are met although they are not always identified as such.	

A.2.4
Discuss any issues or concerns the COV has identified with respect to NSF's merit review system.

1. Inconsistencies between the needs of the program and the two standard NSF criteria made panelists' reviews, panel summary reviews, and program officer reviews difficult to evaluate for sufficiency. The contractor indicated that it used very broad interpretations of NSF's criteria. The COV panelists used similarly broad interpretations in evaluating a random sample.
2. The COV recommends that there be a merit review format developed specifically for large scale education projects that would better meet the needs of both the NSF and specific programs.

A.3 Questions concerning the selection of reviewers. Provide comments in the space below the question. Discuss areas of concern in the space provided.

SELECTION OF REVIEWERS	**Yes, No, Data not available, or Not applicable**
A.3.1 Did the program make use of an adequate number of reviewers for a balanced review? Comments: The number of reviewers increased adequately as the number of submissions increased. Through a review of a random sample of individual reviews, it appeared that the reviewers were able to give substantive and thoughtful feedback indicating that they were not given too many proposals to read.	Yes
A.3.2 Did the program make use of reviewers having appropriate expertise and/or qualifications? Comments: There was a balance in disciplines represented in each cohort. However, in cohort III, there was a substantial increase in number of reviewers who indicated that their expertise was "Other Sciences NEC." If possible, reviewers should be encouraged to select a specific discipline. In addition, reviewers with expertise in the physical sciences were under-represented on the panels.	Yes

A.3.3 Did the program make appropriate use of reviewers to reflect balance among characteristics such as geography, type of institution, and underrepresented groups? Comments: Only 2 reviewers (out of 32) in cohort 2 represented Mid-west. No data for cohort 3—only summary table. South over-represented in cohorts II and III. EPSCoR reasonably represented. Reviewers by type of institution not broken down by cohort. State agencies and urban systems under-represented. Due to unreported data, difficult to determine if racial representation was met. No representation of Native Hawaiian or American Indian. No representation of Persons with Disabilities.	No
A.3.4 Did the program recognize and resolve conflicts of interest when appropriate? Comments: All reporting shows that conflicts of interest were dealt with using standard operating procedures and that there were no unusual occurrences.	Yes

A.3.5
Discuss any concerns identified that are relevant to selection of reviewers.

1. The USP program officers should be commended for putting together review committees that are high quality and reasonably diverse in many categories.
2. Reviewers need to be encouraged to provide accurate and complete demographic data and program officers should discuss which discipline and area of expertise best meet the needs of the program.

A.4 Questions concerning the resulting portfolio of awards under review. Provide comments in the space below the question. Discuss areas of concern in the space provided.

RESULTING PORTFOLIO OF AWARDS	**Appropriate, Not appropriate, or Data not available**
A.4.1 Overall quality of the research and/or education projects supported by the program. Comments: The thoroughness of some districts in developing coherent, district-wide policies and procedures focused on the NSF Drivers was impressive. Strategies encompassed the full range of stakeholders--principals, teachers, professional development providers, parents, community partners, etc. Clearly stated	Yes

accountability and assessments offered a mechanism for revisions and ongoing improvement.	
A.4.2 Are awards appropriate in size and duration for the scope of the projects? Comments: Review of size of award in relation to the student population shows that the amount of the award was proportional to the number students.	Yes
A.4.3 Does the program portfolio have an appropriate balance of: · High Risk Proposals? Comments: All of the proposals submitted for this solicitation are considered to be "high risk" based on the Weighted Risk Table developed by NSF.	Yes
A.4.4 Does the program portfolio have an appropriate balance of: · Multidisciplinary Proposals? Comments: All proposals addressed mathematics and science education across K-12 education; therefore, all were multidisciplinary.	Yes
A.4.5 Does the program portfolio have an appropriate balance of: · Innovative Proposals? Comments: Individual program summaries indicate that innovative approaches and activities increased as the urban program matured. Several focused on cooperative activities designed to change teacher education programs at local universities. One involved a university's Center for Learning Technologies in Urban Schools, and several noted that research would guide the project.	Yes
A.4.6 Does the program portfolio have an appropriate balance of: · Funding for centers, groups and awards to individuals? Comments: All urban projects are joint efforts of large school districts, business and industry, IHEs, and other community groups/agencies. In all cases, the chief school officer (usually the superintendent) is the PI. In addition, the PIs represent a balance of diverse groups.	Not Applicable
A.4.6 Does the program portfolio have an appropriate balance of: · Awards to new investigators?	Not Applicable

Comments: In almost all cases, the PIs were urban superintendents of school and they were new investigators. However, one of the issues the urban program faced was the frequent turn-over in superintendents. Nine sites had one change in PI and in all cases the PI was a new investigator. Eight sites had two to three PI changes and all were new investigators. Two sites had four PI changes, all of whom were new investigators. As the program matured, the balance between new and experienced investigators improved. However, the turn-over of superintendents (investigators) was beyond the control of the program.	
A.4.7 Does the program portfolio have an appropriate balance of: · Geographical distribution of Principal Investigators? Comments: Given the criteria of the program, there is a good balance in geographical distribution.	Yes
A.4.8 Does the program portfolio have an appropriate balance of: · Institutional types? Comments: The program was specifically developed to involve high-risk, urban districts in the sustained reform of math and science education. The criteria of the program specified the type of institution eligible for funding, thus restricting the variety of institutional types.	Not applicable
A.4.9 Does the program portfolio have an appropriate balance of: · Projects that integrate research and education? Comments: The development and implementation of a robust, integrated program of relevant research in systemic reform is a critical aspect of the program. Since the inception of the program, NSF has become more systematic in collecting, organizing, presenting, and disseminating data, particularly data regarding student achievement. Most of the project summaries indicated that the project was using research as a guide. For example, researchers at the University of Michigan have two papers in press concerning the Detroit USP, and the Cleveland jacket indicated that Michigan was to be involved in research at its sites. The Pittsburgh project used research findings from its USI to inform its USP. Less clear are the essential processes, procedures, and resources needed to improve student achievement in mathematics and science. Clear identification of best practices to inform future program modifications is essential if significant long-term progress is to be achieved.	Yes

A.4.10 Does the program portfolio have an appropriate balance: - · Across disciplines and subdisciplines of the activity and of emerging opportunities? Comments: Examples were provided of four emerging opportunities in which universities received supplements for high school laboratory/research activities. All reached reasonable goals. In addition, individual summaries indicated that about half of the projects proposed innovative ways to expand opportunities for students and teachers.	Yes
A.4.11 Does the program portfolio have appropriate participation of underrepresented groups? Comments: African Americans and Hispanics are well represented in all but four projects (Winston-Salem, Hamilton County, Omaha, and Portland) and a majority of minority students were served. Percentages of Hispanic and African Americans students served were approximately equal.	Yes
A.4.12 Is the program relevant to national priorities, agency mission, relevant fields and other customer needs? Include citations of relevant external reports. Comments: As a result of the program, districts, universities, and NSF are continuing to develop understanding and a knowledge base about what is required to improve mathematics and science education. At the initiation of the program, no formal model existed to guide the reform process. NSF challenged districts to examine and develop a comprehensive vision that encompassed such essential components as alignment of resources, establishment of partnerships to support mathematics and science improvement, increasing student performance, etc. This strategy has also defined important infrastructure considerations for systemic reform. The new combination of NSF's review components (e.g., site visits, mid-point review, focused feedback, etc.) has led to substantial changes in the NSF programs and promotions of systemic change. These key strands are designed to generate an emerging national model for promoting mathematics and science systemic reform. Additionally, networking across sites promotes learning and sharing of effective strategies for improvement. Technical assistance, including PI/PD meetings, have made a significant impact on the progress of all sites. Emerging NSF research efforts will ensure that lessons learned, as well as effective models and strategies, inform all programs. The program addresses NSF's goal of 'people' as well as the national priority of well-educated citizens, who have both technological and scientific literacy. It addressed business and industry needs for a scientific and technological workforce.	Yes

A.4.13
Discuss any concerns identified that are relevant to the quality of the projects or the balance of the portfolio.

The USP was an innovative and high-stakes program, which involved urban districts and assorted partners in improving science and math education for all students. As such, projects were affected by many of the issues affecting large urban districts. Designating someone in a high, but more stable administrative position as a Co-PI or an additional PI might have reduced the number of new investigators involved in a project's life.

A.5 Management of the program under review. Please comment on:

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A.5.1
Management of the program.
Comments:

Data indicate careful management, including pre-and post-award site visits, guidelines for POs, and outreach workshops with projects. In addition, a fiscal management workshop and mid-point reviews were held in 2003. The program is to be commended for its outreach to projects in relation to fiscal management. The COV review process found very clear outcomes from the mid point review process. Issues were discussed, solutions were examined, and directions were modified and/or changed

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A.5.2
Responsiveness of the program to emerging research and education trends.
Comments:

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The evolution of the USI program and other components (CPMSA) to evolve into the USP program indicated a high level of program responsiveness to education trends. The USP program responded to the research indicating achievement gaps among subgroups of students as well as the research indicating that algebra is the gate-keeping course for science and mathematics careers. The COV found at least one project specifically applied what it had learned through the evaluation/research of its USI in mathematics to its USP in science.

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A.5.3
Program planning and prioritization process (internal and external) that guided the development of the portfolio under review.
Comments:

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Evidence of very careful planning in the program/portfolio review process was found by the COV. External contractors were used extensively to synthesize large amounts of data that guided the review of the USP portfolio.

A.5.4
Discuss any concerns identified that are relevant to the management of the program.

PART B. RESULTS : OUTPUTS AND OUTCOMES OF NSF INVESTMENTS

NSF investments produce results that appear over time. The answers to the first three (People, Ideas and Tools) questions in this section are to be based on the COV's study of award results, which are direct and indirect accomplishments of projects supported by the program. These projects may be currently active or

closed out during the previous three fiscal years. The COV review may also include consideration of significant impacts and advances that have developed since the previous COV review and are demonstrably linked to NSF investments, regardless of when the investments were made. Incremental progress made on results reported in prior fiscal years may also be considered.

The following questions are developed using the NSF outcome goals in the NSF Strategic Plan. The COV should look carefully at and comment on (1) noteworthy achievements of the year based on NSF awards; (2) the ways in which funded projects have collectively affected progress toward NSF's mission and strategic outcomes; and (3) expectations for future performance based on the current set of awards. NSF asks the COV to provide comments on the degree to which past investments in research and education have contributed to NSF's progress towards its annual strategic outcome goals and to its mission:

- To promote the progress of science.
- To advance national health, prosperity, and welfare.
- To secure the national defense.
- And for other purposes.

Excellence in managing NSF underpins all of the agency's activities. For the response to the Outcome Goal for Organizational Excellence, the COV should comment, where appropriate, on NSF providing an agile, innovative organization. Critical indicators in this area include (1) operation of a credible, efficient merit review system; (2) utilizing and sustaining broad access to new and emerging technologies for business application; (3) developing a diverse, capable, motivated staff that operates with efficiency and integrity; and (4) developing and using performance assessment tools and measures to provide an environment of continuous improvement in NSF's intellectual investments as well as its management effectiveness.

B. Please provide comments on the activity as it relates to NSF's Strategic Outcome Goals. Provide examples of outcomes (nuggets) as appropriate. Examples should reference the NSF award number, the Principal Investigator(s) names, and their institutions.

B.1 OUTCOME GOAL for PEOPLE: Developing "a diverse, competitive and globally engaged workforce of scientists, engineers, technologists and well-prepared citizens."
Comments:

Student Achievement

During the course of development of the several iterations of the systemic initiatives and culminating with the USP, projects within this portfolio incrementally improved the quality of data reported. There was a clear transition to higher quality student outcome data as opposed to simple documentation of participation rates among students and teachers in various initiatives. The support, availability and use of these disaggregated data provided an important foundation for evaluation, research and accountability measures.

These data indicate that many USP districts made significant progress in advancing student participation in high quality math and science curricula and in student achievement. For example, as measured by the MEAP, the Detroit district data showed a positively accelerating annual trend for student achievement in both mathematics and science that far outpaced statewide benchmarking data (see *Nuggets, Book B, 2003*). Another significant trends commonly found among USI/USP participants was increased enrollment in advanced science and mathematics courses in high school. The El Paso USI increased enrollment in algebra and physics from a base line of 63% and 7% respectively to 99% and 23% with only minor decreases in overall student pass rates. Overall, the USP programs led to significant reduction in enrollment disparities between disaggregated student groups. However, in some cases there was a documented reduction in the number of students scoring at the highly proficient level in AP exams (see *Analysis of Implementation and Student Achievement Data, Westat, August 2004; Summary of Trends, Westat, July 2004; Nuggets, Book B,*

2003).

With few exceptions, the greatest gains in student achievement were consistently found among the urban systemic programs that had the longest history of participation (*Academic Excellence for All Urban Students: Their Accomplishments in Science, 2001*).

In an important study of "gate-keeping" indicators (*Academic Excellence for All Urban Students: Their Accomplishments in Science, 2001*), Systemic Research, Inc. documented a variety of positive indications that students were being better prepared for participation in STEM careers. In general USI/USP districts increased rates of participation in mathematics, computer science, and science Advanced Placement (AP) courses. Student participation increased for ACT and SAT. Although advancement to college was one stated goal of the USP, direct data (versus readiness indicators) was not uniformly available. The COV recognizes that for many districts there were not systems in place to track student college enrollment and that reliable data would only become available near or after the end of the NSF funding cycle.

That these positive trends were prevalent among USI/USP projects is noteworthy. The urban systemic programs occurred in a changing environment with respect to standards and accountability. Nevertheless, the USP was reported by district leadership to be an essential support for converging resources and policies in support of student achievement.

Professional Development

Professional development has played a key role in Urban Systemic Programs, as well as other systemic initiatives. Professional development (PD) is major strategy used by all USP sites and 49% of the NSF urban systemic initiatives funds were expended for professional development (*Academic Excellence for All Urban Students: Their Accomplishments in Science, 2001*). According to Portland USP, "professional development continues to be the heart and soul of the work to deepen and sustain a standards-based curriculum" (*Mid-Point Review, 2004*). Professional development activities included a variety of strategies such as summer institutes, after school and weekend workshops, and embedded professional development. Professional development has been reconstituted in USP districts to focus on long-term efforts. This emphasis has led to policy changes such as ongoing, year-round programs; school-based delivery; mandated minimum hours/days of professional development for teachers; and increased expectations for school-based administrators. For example, St. Louis District Policy 4430, A Professional Development Accountability Plan, was adopted and supported to make possible a unified systemic approach to professional development (*Mid-Point Review, 2004*).

Connected to increases in professional development was the involvement of IHEs in the delivery and design of professional development. This has established and improved relationships between higher education and school districts in many ways. For example, Boston USP reported that their collaborative relationship with Harvard University and University of Chicago included the establishment of courses for content knowledge development, teacher certification, and advanced degrees (*Mid-Point Review, 2004*).

Urban systemic initiatives have designated professional development as a cornerstone activity in their efforts to improve student achievement (*Westat, 2004*). Professional development has been considered crucial to the overall success of all aspects of the program, including identifying students' needs, improving instruction, assessing student learning, and increasing student achievement. Science and mathematics professional development focused on mastery of content knowledge and standards, pedagogy, and assessment strategies. Districts also reported that professional development was used to ensure equity for all students specifically by adjusting instructional practices to meet the needs of all students (*Westat, 2004*). In addition, about 44% of USPs identified *helping science and mathematics teachers analyze and interpret assessment data* as a cornerstone activity.

In addition to reaching large numbers of teachers, the COV found evidence that professional development had a larger impact. Several examples are listed here: In science, teachers with high professional development hours reported greater use of multiple assessments than their counterparts with low levels of professional development, especially at the elementary level (*Academic Excellence for All Urban Students: Their Accomplishments in Science, 2001*). One far-reaching initiative of the USP in Miami-Dade County Schools, was a professional development effort that resulted in more than 400 teachers (serving over 100 schools and impacted over 20,000 students) receiving masters or specialist degrees in mathematics or science education (*McKenzie Group, 2002*).

Partnerships

USP stimulated a broad range of partnerships, especially in the public sector. Every NSF urban systemic initiative site reported numerous strong partnerships. Partnerships were formed with more than 125 corporations, foundations, research centers, and laboratories (*Academic Excellence for All Urban Students: Their Accomplishments in Science, 2001*). Colleges and universities were the most prominent partners in the majority of systemic initiative programs. A broad range of science related institutions such as museums, nature parks, and community projects focused on mathematics and science education, were prominent among the partnerships. Chambers of Commerce and other interested business organizations were included as partners, but many were primarily involved through advisory councils. Partnerships between USP schools and businesses resulted in activities such as providing tutoring for students (Nationwide Insurance, Columbus USP), presentations to classes, and some teacher training (Anautics, Inc., Oklahoma USP). The strongest most active partners often had NSF ties, either with present or past funding.

As expected, each of the categories of partners participated in their area of resources. Universities primarily provided professional development training to staff and auxiliary programs to students in science. Museums, zoos, and other science parks developed programs tailored to work with the USPs and collaborated in school and classroom programs.

B.2 ~~NSF~~ OUTCOME GOAL for IDEAS: Enabling "discovery across the frontier of science and engineering, connected to learning, innovation, and service to society."
Comments:

Standards-Based Curriculum

Without exception, the proportion of schools meeting the PRA goal for standards-based curriculum implementation exceeded 95% in both mathematics and science (*Westat, August 2004*). The PRA requires implementation of a standards-based curriculum by 80% of the schools that participated in the program for at least three years. The implementation of standards-based curriculum was a "cornerstone" activity for almost 90% of the urban systemic initiatives. While all USPs implemented standards-based curriculum, there is a difference in the importance that USPs reported for mathematics versus science. Eighty-six (86) percent of USPs reported that developing or adopting standards-based curricula/materials for mathematics was a cornerstone activity, yet only 44% assigned cornerstone status for science.

According to data reported in the *Analysis of Implementation and Student Achievement Data…*, (*Westat, August 2004*) about 93% of elementary schools, about 95% of middle schools, and about 97% of high schools have developed or adopted standards-based curricula/materials in science and mathematics.

Standards-based curricula has had another impact according to several urban systemic sites. The strategy of adopting or developing standards-based curricula/materials served two purposes: a method to ensure greater equity or consistency among schools in a district and a way to raise the level of academic rigor in schools.

Recommendations: See Part C.

Policies

One key goal for the USP was to advance policy formation in support of STEM education and student achievement. In many instances the review, revision and the development of new policies were instigated in direct response to NSF requirements. For example, the Columbus USP director position was elevated to a cabinet level post in order to facilitate dissemination and implementation of USP related policies and practices (*CSP Annual Report, 2003*). All participating districts reported some changes in policies related to SMET education and related teacher professional development. The largest array of policy changes was centered on teacher professional development, often including changes in the financing, incentives, quality evaluation, and opportunities for professional development.

Other leading areas of policy development included: changes in graduation and course-taking requirements, promoting block scheduling, advancing teacher certification requirements, adopting standards-based materials, and implementing advanced data management and uniform reporting requirements (*Westat, August 2004*). As a part of the monitoring and reporting practices created by NSF, each USP was required to highlight selected policies and strategies as primary drivers for change. These "cornerstone" policies were widely reported to have long-term and positive implications for management at the district, school, grade and classroom levels (*Mid-point reviews, cohorts I, II and III*).

Creative Ideas from USPs

Perhaps one of the most important contributions made by the funding of USPs was in spawning creativity. New innovative programs and strategies have been developed in many of the districts. Bringing new stimuli together provided the opportunity for ideas to flow and the districts now had resources to implement these ideas. Creativity touched almost every area of the enterprise from teacher training to student engagement. Although there are a number of these creative ideas, the COV has chosen to cite only a few (*Westat, August 2004*; *A Compilation of Systemic Initiative Site Profiles, McKenzie Group, 2002*).

- Several academies with post-secondary partners were developed. In Cleveland in partnership with Cuyahoga Community College a High-Tech Academy prepared students for immediate employment, continuation at the community college, or transfer to four-year institutions. Students could enroll as early as their sophomore year of high school.
- In Atlanta, programs targeting African American females in mathematics and science at Spellman College, and males at Morehouse College, provide enrichment support and higher education opportunities.
- Columbus, in partnership with Ohio Dominican University, is educating current degree-holding, non-licensed employees to become licensed math and science teachers. The majority of the employees participating in the licensing programs were minority.
- One USP placed ALL students on a college plan in high school. Only those students' whose parents go to the school to request a different plan are removed.
- Several systemic initiatives created summer transition programs, career camps and readiness academies to help transition middle-school students to high school.
- Fifty percent of the systemic initiatives supported high school and university partnerships to create and deliver new pathways to science certification.
- Partnerships with industry and institutions of higher education provided teachers with increased access to and experience with advanced disciplinary expertise. Fifty-six percent of systemic initiatives engaged business and industry consultants to support teacher's instructional practice in science and 39% for the support of mathematics. Thirty nine percent provided high school teachers continuing laboratory internships with institutions of higher education.

Student Support

While one might assume that schools and school districts would have provided the necessary supports that are essential for a quality education, this was not always the case. NSF through the USP enabled and

motivated schools to provide support systems that were missing or inadequate in urban school districts.

Support strategies included policies, materials and facilities, and programs. Policies included increased graduation requirements and access to more rigorous science and mathematics courses. Many remedial and low-level courses were eliminated. In some districts, new facilities were built and some were remodeled to accommodate the new emphasis on science and technology. Computers and graphing calculators were donated by partners, purchased through district funds, or obtained through technology grants and placed into many classrooms. The purchase of additional classroom technology in mathematics and science became more important in school districts as a result of USP implementation.

Research

Through past and ongoing technical assistance NSF has supported efforts that have created databases across USPs that are relatively more standardized than were previously available. These data are being represented in several matrices developed by contractors (e.g., *Westat, August 2004*) but the ability to mine these matrices is somewhat limited.

NSF has planned and funded additional research and technical assistance initiatives, open to past and current systemic initiatives, that are designed to coordinate data collection, advance future research opportunities and support the sustained use of data to improve student achievement.

Recommendation: In the future, as programs are envisioned, evaluators should be convened to preplan and map out data collection strategies. These efforts should focus on establishing data that will be needed and the format and process for collection and analysis.

B.3 OUTCOME GOAL for TOOLS: Providing "broadly accessible, state-of-the-art S&E facilities, tools and other infrastructure that enable discovery, learning and innovation."
Comments:

Assessment

There is little question that assessment increased under USP. In almost every case, the amount and type of data gathered increased dramatically. Information that seemed unimportant became compelling. Data such as course enrollment, course completion, gender, ethnicity, and socioeconomic status became critical. More frequent assessment also took place. Terms such as benchmarks, accountability, disaggregation, qualitative, quantitative, formative, and summative became part of the lexicon of the classroom teacher as teachers became a major consumer of assessment data.

Not only did the amount of student assessment increase but also the use of those data in instructional programs became prevalent. The use of data in decision-making, curriculum design, and daily classroom planning became a part of urban school district culture. Two other factors, state accountability requirements and technology, made the need for and the use of data both compelling and manageable. One can logically conclude that this explosion of assessment and data collection and management improved instruction and prepared schools for the coming of the *No Child Left Behind Act*.

B.4 OUTCOME GOAL for ORGANIZATIONAL EXCELLENCE: Providing "an agile, innovative organization that fulfills its mission through leadership in state-of-the-art business practices."
Comments:

Risk Management

USPs represent complex partnership structures involving multiple organizations each of which has varied degrees of experience in managing NSF grants. Assuring fiscal oversight, within NSF guidelines, and across

multiple different USPs is a challenge. In order to meet this challenge NSF/USP leadership has created a financial management plan, PI/CFO workshops, and related support materials that have found utility across the NSF. This is an example of creatively mining the resources to serve the broader needs of the organization.

Financial Management

USP districts were expected to use the financial practices of the NSF for program financial management. The Financial Management Resource Notebook was used as a guidebook for districts to follow the many policies and requirements of NSF funding requirements. The Notebook might have value as a reference but as an operating document it appears to be cumbersome and complex.

Recommendation: NSF should provide school districts with much simpler and user-friendly guidelines for financial management. School districts are regulated by their state, and the imposition of cumbersome financial management requirements leads to unreasonable and unproductive costs. USP grants were a small portion of an urban school district's budget but required disproportionately greater resources to administer thereby reducing the resources that had direct student impact.

PART C. OTHER TOPICS

C.1 Please comment on any program areas in need of improvement or gaps (if any) within program areas.

C.2 Please provide comments as appropriate on the program's performance in meeting program-specific goals and objectives that are not covered by the above questions.

The Urban Systemic Program met various goals that were not specifically covered by the COV review. For example, it was successful in recruiting a diverse set of urban districts to the program.

C.3 Please identify agency-wide issues that should be addressed by NSF to help improve the program's performance.

In general, NSF needs to consider the special issues surrounding the review and management of large-scale projects that involve diverse K-12 districts. Clearly, the USP has provided excellent guidelines for improving financial management. These guidelines may prove very helpful with the Math/Science Partnership program as well as in other areas of the Foundation.

C.4 Please provide comments on any other issues the COV feels are relevant.

Science

The COV has struggled with the seeming discrepancies between mathematics and science implementation across urban systemic initiatives. Understandably districts have been influenced by both national and state high-stakes assessment, which in most places has emphasized mathematics and reading versus science. There appear to be differences in many areas. For example, districts were less likely to identify science as a "cornerstone" activity. Increases in student enrollment and achievement in higher- level courses in science appeared to be less than gains in mathematics.

Partnerships

Based on the study by *Borman, 2001 Assessing the Impact of the NSF's Urban Systemic Initiative*, the COV recommends that less emphasis and effort be put into the stakeholders/community aspect of future programs. The negative impact on student achievement and personal experience causes us to recommend scaling back expectations for partnerships. We do not recommend the elimination of partnerships, but a more focused, reasonable use of community resources and involvement.

C.5 NSF would appreciate your comments on how to improve the COV review process, format and report template.

The use of a contractor to summarize and synthesize review findings was extremely useful. It expedited the review process, providing time for careful review of documents related to specific questions. The report template (Part A) does not correspond well with some components of large-scale education projects. These components are indicated in the appropriate sections.

Additional Questions/Issues for the COV

Dissemination

The program was pro-active in alerting the community about the opportunities of the USP. Through workshops, PI meetings, and other venues, the program not only informed participating agencies, but it also generated interest among non-participants.

Lessons learned from the USP portfolio include:

- Student achievement gains did not happen overnight. Long term efforts are needed.
- Data collection and reporting should be a high priority, including the use of data for programmatic and instructional improvement.
- A common curriculum provides consistency for implementation efforts in a district.
- Rigor and high expectations for all students in all schools is an absolute necessity to eliminate achievement gaps.
- Standards-based curricula can be used to incorporate both rigor and consistency in a district.
- Assessment can be a powerful tool for implementing change.
- Professional development must be of high quality, long in duration, and focused on content knowledge and instructional practices to make an impact on student achievement.
- Inclusion of school-based leadership is vital for high implementation levels.
- It is NOT enough to increase enrollment or participation in higher-level courses if classroom and assessment practices are not changed to meet the needs of ALL students.
- The results of *Assessing the Impact of the NSF's Urban Systemic Initiative* (Borman report, 2002), should be disseminated and further investigation should be conducted. The report and findings should be used to initiate further research regarding the impact of instructional influences, equity, and the apparent relationship between high quality mathematics professional development and student achievement gains.

Evaluation

Contractors collected and synthesized massive amounts of data on the sites. Research papers are in preparation to disseminate the findings. In addition, there are thorough reports prepared by various contractors.

Through past and ongoing technical assistance, NSF has supported efforts that have created databases across USPs, which are relatively more standardized than those previously available. These data are being represented in several matrices developed by contractors (e.g., *Westat, 2004*) but the ability to mine these matrices is somewhat limited. NSF has planned and funded additional research and technical assistance initiatives, open to past and current systemic initiatives, that are designed to coordinate data collection, advance future research opportunities, and support the sustained use of data to improve student achievement.

Using NAEP data, *Lee* (*2000*) estimates that changes in student achievement data require 30 years after the intensive reform period. A promising additional evaluation effort could follow a subset of the districts for another 5 years.

The COV makes the following recommendations:

- It appears from recent research and data manipulations that the data are appropriate and sufficient with the following exceptions:
  - * Tracking students going into postsecondary education
  - * Open access to **ALL** data
- Cross tabulation of significant variables.
- Continued research such as the *Clewell and Borman* studies, *Horizon Research, LSI research*, and *Jason Kim's ISI Evaluative Study*, 2001, should be conducted.

Sustainability

Additional strategies that can help sustain the USP effort beyond NSF funding include:

- Sharing research such as "highly effective" schools.
- Providing human and technological resource information (who to contact if….).
- Requiring all postsecondary institutions that are providing services to districts to include district and school-based administrators in the planning, implementation, and evaluation of services.
- Maintaining electronic access to resources.
- Communication and relationships must be established and maintained .

- Curriculum supervisors and others responsible for daily implementation (not just superintendents).
- Continued efforts to establish policies that support science and Mathematics.

Challenges

Some of the major challenges identified by the COV are:

- Managing large systems.
- Maintaining a highly-qualified teaching force.
- Hiring, training, and growing high-quality school administrators.
- Implementing and sustaining changes in high schools.
- Raising student success in more academically rigorous classes must be absolutely, positively elevated to the highest priority status.
- Correlation and connections where possible to NCLB legislation.
- Sustainability with limited resources for things such as mentors and support teachers.
- Continued collection of student achievement and enrollment data in order to track long-term change.

Responsive to 1999 report: Yes, there were many recommendations, and the staff responded appropriately to all of them.

SIGNATURE BLOCK:

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For the [Replace with Name of COV]
[Name of Chair of COV]
Chair

[1][1] To be provided by NSF staff.
[2][2] To be provided by NSF staff.