

**MEMORANDUM**

**DATE:** December 19, 2005

**TO:** Bernice Anderson, Senior Advisor on Evaluation  
 Directorate for Education and Human Resources (EHR)

**FROM:** Diane M. Spresser, Senior Program Coordinator  
 Math and Science Partnership (MSP) Program, EHR

**SUBJECT:** Committee of Visitors (COV) for Math and Science Partnership (MSP) Program  
 Conflict of Interest (COI) and Diversity Memo

The Committee of Visitors (COV) report for the Math and Science Partnership (MSP) Program was approved at the EHR Advisory Committee meeting held at NSF on November 2, 2005. The COV consisted of seven members selected for their expertise related to the goals of the program. They provided a balance with respect to the type of institutions supported through the program, gender and representation from underrepresented groups. The following table shows the main features of the COV's diversity.

<b>Category of COV Membership</b>	<b>No. of COV Members in Category</b>
Member of EHR Advisory Committee.....	.....1.....
Institution Type:	
<input type="checkbox"/> University.....	.....4.....
<input type="checkbox"/> Four-year College (HBCU) .....	.....1.....
<input type="checkbox"/> Two-year College.....	.....
<input type="checkbox"/> K-12 School or LEA.....	.....1.....
<input type="checkbox"/> Industry/Foundation .....	.....1.....
<input type="checkbox"/> Federal Agency.....	.....
Location	
<input type="checkbox"/> East.....	.....2.....
<input type="checkbox"/> Midwest/North .....	.....1.....
<input type="checkbox"/> West.....	.....3.....
<input type="checkbox"/> South.....	.....1.....
Gender	
<input type="checkbox"/> Female.....	.....3.....
<input type="checkbox"/> Male.....	.....4.....
Race/Ethnicity	
<input type="checkbox"/> White.....	.....4.....
<input type="checkbox"/> Black.....	.....1.....
<input type="checkbox"/> Hispanic.....	.....2.....
<input type="checkbox"/> Asian.....	.....
<input type="checkbox"/> Pacific Islander.....	.....

The COV was briefed on Conflict of Interest (COI) issues and each COV member completed a COI form. COV members had no conflicts with any of the proposals or files selected for review.

**CORE QUESTIONS and REPORT TEMPLATE**  
**for**  
**FY 2005 NSF COMMITTEE OF VISITOR (COV) REVIEWS**

**Guidance to NSF Staff:** This document includes the FY 2005 set of Core Questions and the COV Report Template for use by NSF staff when preparing and conducting COVs during FY 2005. 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 sub-activities 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 2005 REPORT TEMPLATE FOR  
NSF COMMITTEES OF VISITORS (COVs)**

<b>Date of COV</b> 5/16-18/05
<b>Program/Cluster:</b> Math and Science Partnership (MSP) Program
<b>Division:</b> Office of the Assistant Director, Education and Human Resources (EHR)
<b>Directorate:</b> EHR
<b>Number of actions reviewed by COV<sup>1</sup>:</b> 67 <b>Awards:</b> 18 <b>Declinations:</b> 49 <b>Other:</b> 0
<b>Total number of actions within Program/Cluster/Division during period being reviewed by COV<sup>2</sup>:</b> 880 <b>Awards:</b> 81 <b>Declinations:</b> 788 <b>Other:</b> 11
<b>Manner in which reviewed actions were selected:</b>  <p>In consultation with the COV chair, approximately 25% of the 48 Partnership awards in the MSP portfolio (one-fourth of the Comprehensive awards, one-fourth of the Targeted awards and one-fourth of the Institutes) were randomly selected. Within each category, sorted/ordered by NSF-assigned proposal number (from “lowest” to “highest”), awards were selected by “last digit” until the desired sample size was reached. The COV chair selected “3” as the “first pick” and “5” as the second “pick.” If, following the selection of all awards ending in “3”, the desired sample size was not reached, then awards ending in “5” were selected in turn. If this procedure did not yet yield a sample of sufficient size, selection proceeded from the jackets remaining in the category with every third jacket until the desired sample size was reached. This procedure resulted in 4 Comprehensive Partnerships (25% of the 12 awards), 6 Targeted Partnerships (25% of the 24 awards), and 3 Institute Partnerships (slightly more than 25% of the 8 awards), for a total sample of 13 jackets from the portfolio of 48 Partnership awards.</p> <p>The same procedures were applied to select 5% of the RETA awards (non-planning awards) and 5% of the declinations, resulting in a sample of 3 RETA awards and 40 declinations. The total sample of MSP actions randomly selected by this process was of size 56: 16 awards and 40 declinations.</p> <p>In addition, during its on-site meeting, the COV requested the opportunity to review all jackets for the Partnerships invited for reverse site visits under the most recent solicitation and the program supplied the 14 jackets for those Partnerships. Three of the 14 were already part of the random sample available to the Committee. The remaining 11 were added: two awards and nine declinations.</p> <p>A total of 67 actions were therefore reviewed by the COV: 18 awards and 49 declinations.</p>

**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.

<sup>1</sup> To be provided by NSF staff.

<sup>2</sup> To be provided by NSF staff.

**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.

<b>QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES</b>	<b>YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE<sup>3</sup></b>
<p>1. Is the review mechanism appropriate? (panels, ad hoc reviews, site visits) Comments:</p> <p>The review mechanism is appropriate. The COV commends NSF for adding reverse site visits to the review process. This addition certainly assists in making funding decisions and helps establish the validity of the process.</p>	<p>Yes</p>
<p>2. Is the review process efficient and effective? Comments:</p> <p>The reverse site visits were particularly effective.</p>	<p>Yes</p>
<p>3. Are reviews consistent with priorities and criteria stated in the program’s solicitations, announcements, and guidelines? Comments:</p>	<p>Yes</p>
<p>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? Comments:</p> <p>Individual reviews are, by their nature, more variable than the panel summary, but they do let the PI get a sense of how different individuals see their proposal. When there was a lack of clarity or depth in the individual reviews, the panel summary often captured the substantive comments of the discussions or other reviews.</p>	<p>Yes</p>

<sup>3</sup> If “Not Applicable” please explain why in the “Comments” section.

<p>5. Do the panel summaries provide sufficient information for the principal investigator(s) to understand the basis for the panel recommendation? Comments:</p>	<p>Yes</p>
<p>6. Is the documentation for recommendations complete, and does the program officer provide sufficient information and justification for her/his recommendation? Comments:</p> <p>There is sufficient and detailed data and justification for the recommendation of the program officer. The COV noted that the justification of the recommendations for the MSP comprehensives also included details about the process of the review.</p>	<p>Yes</p>
<p>7. Is the time to decision appropriate? Comments:</p> <p>87.8% were awarded or declined within 6 months; 7% were awarded within 9 to 12 months; solicitation 02190 and 03605 (institute partnerships) had a relatively long response times (9-12 months). The COV did not find any evidence to indicate a reason for these differences.</p>	<p>Yes</p>

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

The merit review process is one of the hallmarks of NSF project review, bringing experts from a variety of fields related to STEM teaching and learning together to critique proposals for funding. The COV finds that this process serves to highlight key areas for improvement in those projects that are strong enough to support. It also provides for determination of weaknesses from various viewpoints.

The COV had concerns that in some cases the individual panel members gave undue weight to the reputations of the PIs in making their recommendations. NSF needs to continue to monitor the number of awards given experienced PIs and new PIs, and to be sure that reputations do not have more force than they should.

The COV noted that, following the panel review, the questions posed by the cognizant program officer and responses to those questions were both detailed and substantive. This aspect of the proposal review process is well-developed and functional. The attention to detail and level of specific probing is much more significant than is accomplished by the outside review panel collectively or individually. This pattern, if consistent across project jackets, is evidence of the strategic importance of NSF program officers in helping PIs correct flaws or missed opportunities in project design and the continuity of NSF staff in project monitoring. The Committee sees the NSF program staff as vital to the negotiation and implementation of high quality STEM education proposals.

**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 <sup>4</sup>
<p>1. Have the individual reviews (either mail or panel) addressed both merit review criteria? Comments:</p> <p>The COV recognizes that there has been a concerted effort to address the merit review criteria. However, the COV itself had a difficult time discerning exactly what qualified as “intellectual merit” and “broader impacts.” Some committee members felt that some of the reviews paid only “lip service” to these criteria, while others felt that these criteria were properly addressed. In any event, the COV agreed that there has been a definite shift toward addressing these criteria over the past few years.</p>	Yes
<p>2. Have the panel summaries addressed both merit review criteria? Comments:</p> <p>Most of the panel summaries commented on both merit criteria but, similar to the individual reviews, they often did not have substance.</p>	Yes
<p>3. Have the review analyses (Form 7s) addressed both merit review criteria? Comments:</p> <p>In a few cases, the review analyses did not explicitly address both merit review criteria, but merely stated that panelists did apply the NSF-wide merit criteria.</p>	

<sup>4</sup> In “Not Applicable” please explain why in the “Comments” section.

4. Discuss any issues the COV has identified with respect to implementation of NSF's merit review criteria.

There appears to be some confusion by the proposers and reviewers on how to apply both of the merit review criteria. Thus, the COV recommends that EHR continue to develop its own concepts of the merit review criteria, continue to educate the field about the nature and meaning of these criteria, and disseminate a broad view of these merit review criteria to prospective applicants and panelists.

The COV found many instances where the criteria of broadening the participation of underrepresented groups was neglected by the reviews.



**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 <sup>5</sup>
1. Did the program make use of an adequate number of reviewers?	Yes
2. Did the program make use of reviewers having appropriate expertise and/or qualifications?	Yes
<p>3. Did the program make appropriate use of reviewers to reflect balance among characteristics such as geography, type of institution, and underrepresented groups? Comments:</p> <p>Reviewers include university disciplinary and education faculty, education consultants, K-12 teachers and administrators, business people, and professional organization leaders---quite diverse!</p> <p>The change in reporting minority classifications is making it difficult to determine if an appropriate balance of underrepresented groups exists.</p> <p>The COV noted a decline in the number of reviewers from underrepresented groups from 38.8% in 2002 to 24.7% in 2003. Some members expressed concern about this decline, while others felt that 24.7% was perfectly acceptable. There was a concern, however, about the decline in the number of Native American reviewers in 2003.</p>	Not yet

<sup>5</sup> If “Not Applicable” please explain why in the “Comments” section.

<p>4. Did the program recognize and resolve conflicts of interest when appropriate? Comments:</p> <p>All conflicts of interest were identified and resolved.</p>	<p>Yes</p>
<p>5. Discuss any issues the COV has identified relevant to selection of reviewers.</p> <p>NSF must continue the practice of inviting new reviewers to serve on panels with experienced reviewers. This practice is important in order to positively affect both the number of reviewers and PIs from underrepresented groups or institutions.</p>	

**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.

<p align="center"><b>RESULTING PORTFOLIO OF AWARDS</b></p>	<p align="center"><b>APPROPRIATE, NOT APPROPRIATE<sup>6</sup>, OR DATA NOT AVAILABLE</b></p>
<p>1. Overall quality of the research and/or education projects supported by the program. Comments:</p> <p>The COV was extremely impressed with the overall quality, specific focus, and potential scalability of the teacher institutes. The comprehensive and targeted projects are much more complex and therefore it is more difficult to assess their overall quality. RETA proposals reviewed were found to be of high quality and have the potential to impact the field.</p> <p>The RETA portfolio consisting of 32 projects collaborates with MSPs and other RETAs. Addition of further technical assistance and evaluation would likely add little to the substance of the portfolio at this point.</p>	<p>Appropriate</p>
<p>2. Are awards appropriate in size and duration for the scope of the projects? Comments:</p> <p>Some members of the COV questioned the value of requesting proposals of this large a scope as they demand a level of commitment, expertise and leadership that very few potential PIs have. NSF's awareness of and reaction to this situation was apparent in the discussion with the NSF program officers.</p>	<p>Yes</p>

<sup>6</sup> If "Not Appropriate" please explain why in the "Comments" section.

<p>3. Does the program portfolio have an appropriate balance of high-risk projects:</p> <p>The COV had difficulty agreeing on exactly what was meant by “high-risk” here. Some members felt that almost all of the proposals were fairly conservative and, in many senses, very similar to each other. Some even felt that this was an NSF-wide problem. Other members disagreed and questioned whether NSF really wanted to spend the considerable dollars in the comprehensive program on high-risk ventures. In the end, the COV felt that this question was perhaps more appropriate for other NSF programs and hence “not really applicable” to MSP.</p>	<p>Not applicable</p>
<p>4. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> <li>• Multidisciplinary projects?</li> </ul>	<p>Yes</p>
<p>5. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> <li>• Innovative projects?</li> </ul> <p>Comments:</p> <p>The scope of the comprehensive projects makes it difficult to be innovative yet 0314866 had various elements of innovation, e.g., analyzing assessments at a level that would result in changing the topic placement in math and science curriculum. The teacher institutes and RETAs have more scope for innovation.</p>	<p>Yes</p>
<p>6. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> <li>• Funding for centers, groups and awards to individuals?</li> </ul> <p>Comments:</p>	<p>Yes</p>
<p>7. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> <li>• Awards to new investigators?</li> </ul> <p>Comments:</p> <p>Because of the large scope of the comprehensive and targeted MSP awards, the COV felt that it would not be appropriate to have a large number of new PIs in this portfolio, yet 8 out of 32 RETAs were awarded to new PIs.</p>	<p>Yes</p>

<p>8. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> <li>• Geographical distribution of Principal Investigators?</li> </ul> <p>Comments:</p> <p>Yes, of the 12 comprehensive MSPs, 2 were in EPSCoR states; 3 of 28 targeted awards and 1 of 8 teacher institutes also are located in these states.</p>	<p>Yes</p>
<p>9. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> <li>• Institutional types?</li> </ul> <p>Comments:</p> <p>HBCUs are not included as lead partners and only five are indicated as minority partners.</p>	<p>Not yet</p>
<p>10. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> <li>• Projects that integrate research and education?</li> </ul> <p>Comments:</p>	<p>Yes</p>
<p>11. Does the program portfolio have an appropriate balance:</p> <ul style="list-style-type: none"> <li>• Across disciplines and sub-disciplines of the activity and of emerging opportunities?</li> </ul> <p>Comments:</p>	<p>Yes</p>

<p>12. Does the program portfolio have appropriate participation of underrepresented groups? Comments:</p> <p>There appear to be a large number of Hispanic/Latino teachers being served. The same cannot be said for African American teachers. At the leadership level, only 1.2% of targeted projects' PIs and Co-PIs are African American; looking at the entire MSP portfolio, only 6% of the PIs and Co-PIs are African American and only 6% Hispanic/Latino. NSF needs to continue to work to increase these numbers. NSF should be commended for their efforts in reaching out to diverse communities to serve the Hispanic population.</p> <p>Preliminary data for MSP cohorts regarding teacher diversity suggests a broad representation of Hispanics. The COV recognizes that the comprehensive projects in El Paso (0227124) and Puerto Rico (0314557) have a major impact on these numbers.</p> <p>The COV 's impression is that a large number of African American teachers are not being served by this portfolio.</p>	<p>No, not yet</p>
<p>13. Is the program relevant to national priorities, agency mission, relevant fields and other customer needs? Include citations of relevant external reports. Comments:</p> <p>The program resonates with state standards and the national NCLB. It is also making strong efforts to integrate research and education practices.</p> <p>On October 2003, the U.S. House Science Committee Chairman Sherwood Boehlert led a hearing that reviewed the NSF MSP program. They found the MSPs “on the right track toward improving math and science education.”</p> <p>In spring 2004, the Office of Inspector General completed an audit of NSF’s Math and Science Partnership Program and stated that “Since the original MSP program solicitation in FY2002 was developed, NSF has strengthened the evaluation requirements for the projects in successive solicitations by explicitly requiring projects to have quantitative measurements and an independent evaluator.”</p>	<p>Yes</p>

14. Discuss any concerns relevant to the quality of the projects or the balance of the portfolio.

The quality of the projects seems strong but there is an inherent risk in programs of this complexity that major challenges will arise.

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

1. Management of the program.

Comments:

The COV was unanimously impressed with the quality and level of management especially given the timeline to develop this program. NSF needs to be commended on this.

The program of monitoring, oversight and assistance, represented by cooperative agreements, strategic plans, PI meetings, site visits and annual reports, not only ensures that the taxpayer money is being well spent but also requires the project leadership to develop a systematic approach to planning and management.

2. Responsiveness of the program to emerging research and education opportunities.

Comments:

In designing the MSP program, NSF has been responsive to its own experience over the past 10 to 15 years and to the opportunities and needs raised by NCLB. As the program has developed, NSF has responded nimbly to new opportunities and needs, as evidenced by the targeted funding of research and development of new tools in the RETAs, and as evidenced by the addition of the focused Teacher Institutes.

3. Program planning and prioritization process (internal and external) that guided the development of the portfolio.

Comments:

The urgency with which this program was created made it difficult to think through the complexities, yet, the quality of the management reflects thoughtful, well organized, dedicated and systemic planning.

4. Additional concerns 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:

It is still too early to determine the overall impact of the MSP program on outcomes for people: raising the mathematics and science achievement of students, increasing the content knowledge level of mathematics and science teachers, and increasing the quality, quantity, and diversity of the teacher workforce. For the most part, these are five-year projects that have, as yet, gathered two years of data, at most. However, it is vital that tools and systems be put in place now to enable NSF to answer questions about impact by the time the program has been in place for five years.

Student assessment will allow measurement of gains in student achievement, and some of the RETAs address student assessment (e.g., NAS project on science assessment (0236511)). Some of the targeted projects have undertaken novel methods of assessment; for instance the project Teachers Assisting Students to Excel in Learning Mathematics (0227303) has a component where students themselves (with their teachers' guidance) monitor and self-assess their own improvement in mathematics classes. It will be important also to measure student enrollment in challenging curriculum and success in advanced courses.

Processes for measuring growth in teacher content knowledge and effectiveness are less well-developed, but NSF should pay attention to pre- and post-testing of teachers, to classroom observation, and in general to ensuring that across projects the growth of teacher knowledge can be measured. Again, some of the RETA's are developing tools for assessing teacher knowledge; EHR should ensure that tools such as these are incorporated into the targeted and comprehensive projects' evaluation plans. The fact that NSF is offering assistance in this endeavor by funding such projects as Building Evaluation Capacity of STEM Projects (0233472) is an indication that such evaluations will take place across the board. Finally, in order to measure growth in the quality, quantity, and diversity of science and mathematics teachers, it will be very important for partner IHEs to track how many of their graduates obtain licensure, find jobs (especially in partner districts), and succeed in their initial mathematics and science teaching assignments.

**B.2 OUTCOME GOAL for IDEAS: Enabling “discovery across the frontier of science and engineering, connected to learning, innovation, and service to society.”**

Comments:

One of the main goals of the MSP program is to increase the involvement of higher education disciplinary faculty in K-12 education endeavors. This is a laudable goal. The MSP program appears to be successful in engaging mathematicians and scientists, but there is emerging evidence about the degree to which STEM faculty are actually involved. Of 739 IHE respondents to the 2003-2004 MIS survey, 19% reported their field of research as mathematics and 28% reported it as science or engineering, while 35% reported their field of research as education. Similarly, 25% reported their field of instruction as mathematics and 36% reported it as science or engineering, while 24% reported it as education.

Nevertheless, reading through the jackets suggested greater involvement by education than disciplinary faculty, and it is not clear as yet how successful the funded projects have been in bringing new disciplinary faculty into this program. For example, only two disciplinary faculty members are involved in the Cal State Fullerton targeted project (0227303) (the rest are math ed faculty), only three faculty participate in the University of Colorado Denver project (0412343), and Rochester (0227603) has five faculty listed as participating. The MSP MIS report indicates that more than 500 disciplinary faculty are involved in this program, but it is difficult to judge the level of involvement since approximately 100 of the respondents to the survey indicate that their level of involvement is fewer than 40 hours per year. To better track level of involvement of STEM faculty, it would be useful to see the MIS report cross-tabulate field of research and teaching with hours of participation in MSP activities.

**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:

The MSP program will provide first-rate learning environments to hundreds of thousands of students and teachers.

As an example, the award 0233445 has produced the following tools:

- Web site with resources and links for MSP evaluators developed.
- Web Alignment Tool (WAT) was developed to analyze the alignment of curriculum standards and student assessments. WAT is designed to produce measures on five criteria. It has been tested in several states to analyze standards and assessment in not only science and mathematics but also language arts and social studies.
- Adding Value Tool for MSP projects to help them perform value added analyses.
- Tools to model year-to-year growth that considers student mobility.

Cohort 1 and 2 RETAs have also produced a variety of new tools for evaluation, research, and technical assistance (19 instruments as of 4/05). These include, for example, instruments to assess teachers' mathematical and/or scientific knowledge and pedagogy, a tool for measuring student and teacher motivation, one to measure students' scientific knowledge, observation logs, a tool to analyze the alignment of standards and assessments, and a rubric for use in examining the content of mathematics instruction in videotapes.

**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

## **PART C. OTHER TOPICS**

### **C.1 Please comment if applicable on the performance of this program as a major research and development effort in STEM education.**

As a major STEM education initiative, the concept and drive for MSP originated outside the National Science Foundation. In its original formulation, research was not a major component of MSP. Instead, MSP was largely an implementation initiative designed to increase the capacity of the STEM teaching force and to advance STEM learning among students. Through the efforts of NSF leadership and program staff, MSP solicitations ultimately incorporated significant research components, both in comprehensive and targeted projects, and most directly in RETA awards. Historically, NSF has recognized and contributed to the advancement of STEM education directly. To its credit, NSF has also found ways to infuse the MSP programs and projects with significant research activities that will contribute to the enduring knowledge base for STEM education.

### **C.2 Please comment if applicable on the performance of this program compared with other programs having a focus on STEM educational efforts.**

The COV applauds NSF for achieving a breadth in the MSP portfolio that supports the integration of research and implementation, along with capacity building designed to improve learning outcomes in high quality mathematics and science by all students, at all pre-K-12 levels. This represents an impressive contribution to the national capacity to engage in MSP project goals 1 and 3.

Both comprehensive and targeted MSP projects are asking significant questions whose solutions may be scalable if positive results are found. These questions speak to all five of the MSP key features. Building the scope of MSP Learning Network Conferences is one significant venue for dissemination of results. The COV supports the NRC professional development efforts to provide related professional development for project staff that will increase the focus and definition of project outcomes.

The development of Teacher Institutes for the 21<sup>st</sup> Century represents a focused addition to the MSP that the COV sees as potentially very significant for long-term sustainability. The more limited scope of the Institutes received very positive support from the COV.

The scope and stature of the program has been sufficient to attract some interest by STEM disciplinary faculty. This success needs to be enhanced by analysis of the character of that involvement and the increased involvement of policy leaders of IHE partners to support long-term involvement and sustainability.

The development of the evaluation framework, Evidence: An Essential Tool: Planning for and Gathering Evidence Using the Design-Implementation-Outcomes (DIO) Cycle of Evidence, is a positive example of the combination of vision and practicality demonstrated by NSF program staff. There is a significant contribution to the evaluation literature beyond the needs of MSP. Continued emphasis on the generation of outcomes evaluation that can

significantly influence fundamental structural, foundational aspects of K-16 curriculum and instruction remains a central challenge. For example, will the VCU Institute demonstrate the impact of elementary math specialists in a way that can reform the structure of K-5 approach to STEM teaching and learning? (0412324 VCU)

**C.3 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.**

If appropriately monitored, the plans and current activities of the MSP projects appear likely to lead to accomplishment of MSP Goals 1 and 2, i.e., increasing the capacity of schools to provide students with challenging curriculum and opportunities for success in advanced courses, and increasing the quality, quantity and diversity of the mathematics and science teaching force. The COV believes that careful attention to the knowledge gained from the projects and the effort to package and communicate that knowledge, can allow the impact of these projects to extend beyond the current sites of the MSPs (affecting 500 K-12 school districts, 140,000 teachers, and 4.2 million students) to have a national impact.

Progress is already evident with regard to Goals 3 and 4, which address building the national capacity for large-scale reform and engaging a broad learning community in new knowledge being generated. Just as the RETA program has made multiple connections with targeted and comprehensive MSP projects to carry out research and provide technical assistance, NSF program officers should continue to facilitate connections and cross-fertilization among MSP projects, Centers for Learning and Teaching, and Science and Learning Centers.

**C.4 Given that funding for the MSP program may not permit new Partnership awards in the future, please comment if applicable on how the program might best focus its work at this time,**

The COV felt that there were several focus areas that could be important. One area is to develop a process to research the long-term effects of the MSP programs. These longitudinal studies should have an extended timeframe (five to seven years or longer) and could provide data important in determining whether the results of the projects are having causative effects.

Another effort should be to fund additional Teacher Institutes. Although results are not yet available on the outcomes of the currently funded institutes, the COV was sufficiently impressed with their potential to encourage the extension of the program.

A third area that should be pursued is to provide significant assistance to the larger programs in their efforts to institutionalize the improved practices associated the MSP projects. This should involve the engagement of university leadership, state leadership, and foundation leadership. Additionally, mechanisms should be developed to mine the MSPs in order to offer significant input to state MSPs. Efforts should also be made to inform state education leaders about the strategies and successes of the MSP program. Sustainability

through ideas should be an important thrust. This could involve publications and workshops.

**C.5 Please provide comments on any other issues the COV feels are relevant.**

NSF was wise to assign only experienced program officers to this inherently difficult-to-manage program.

**C.6 NSF would appreciate your comments on how to improve the COV review process, format and report template.**

It is difficult to ferret out what is really important in the large amount of complex information available to the COV, especially in the comprehensive MSPs. Often reviewing only a sub-sample of a sub-sample, it is a challenge to draw meaningful generalizations and conclusions. The proposed E-jacket has the potential to greatly improve COV effectiveness, especially if it allows sorting, selecting and manipulation of the data base. A reviewer could more readily oscillate between the general and particular, drawing conclusions about individual awards and the entire portfolio. The COV process would then resemble a research project and the results generated would be more solid and verifiable.

**SIGNATURE BLOCK:**

---

For the MSP COV  
Robert L. Devaney  
Chair