

**FY 2011 REPORT TEMPLATE FOR
NSF COMMITTEES OF VISITORS (COVs)**

The table below should be completed by program staff.

Date of COV:	April 28-29, 2011
Program/Cluster/Section:	Math and Science Partnership
Division:	Division of Undergraduate Education (DUE)
Directorate:	Education and Human Resources (EHR)
Number of actions reviewed:	<p>Awards: 33 (3 of which were funded with ARRA money)</p> <p>Declinations: 20</p> <p>Other:</p>
Total number of actions within Program/Cluster/Division during period under review (FY '08, '09, & '10):	<p>Awards: 146 (71 New Projects and 75 Supplements); 10 of New Projects were funded with ARRA money</p> <p>Declinations: 291</p> <p>Other: 21 Return Without Review</p>
Manner in which reviewed actions were selected:	<p>The Chair advised that the following number of proposals should be reviewed: Phase II = 3, Targeted = 5, Institute = 5, Start =6, RETA/Other = 6, Supplements = 8, Declinations = 20</p> <p>For Awards: The overall method applied was to count off by fours in each of the six categories (Phase II, Targeted, Institute, Start, RETA/Other, and supplements) separately; to then take all awards ending in the #3 until the desired number in each category was obtained; if necessary to then select awards ending in the #4, if the desired number had still not been obtained.</p> <p>This method was modified as follows for the following categories.</p> <p>Institute and Start Partnerships: Using sampling method of counting by four and then selecting anything that ended in a #3 or # 4 did not obtain the number of five proposals desired; therefore after first applying the method, the counting by four continued by cycling back through the numbers, e.g. after number 4 and 8 were selected, counted 9, 10, 11, and then 1, so #1 was selected.</p>

Supplements: To ensure that the eight supplements selected were not all from the same year, but rather span the years of the COV, the fourth supplement numerically submitted in each year FY'08, '09, & '10 was selected first, and then the cycle of counting by fours was repeated; however, as there were only five supplements with a FY'10 number, only proposals starting with FY'08 or FY'09 were included in the repeated application of counting by four until eight supplement were selected; this resulted in four supplements with proposal numbers starting '08, three from '09, and one from '10; they were selected without regard for MSP category type as requested by the COV Chair.

For Declinations: Proposals ending in the number 3 were selected without regard to category as requested by the COV Chair.

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.

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

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE ¹
<p>1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?</p> <p>Comments:</p> <p>The review methods used for evaluating proposals included panel and ad hoc reviews. The panel reviews are an appropriate method which allows for selection of the most meritorious proposals as well as provides insights and feedback on the proposals. In general there were five reviewers per proposal who provided varying degrees of critical examination of the proposals, as well as panel summaries and Program Officer review analyses.</p>	YES
<p>2. Are both merit review criteria addressed</p> <p>a) In individual reviews?</p> <p>b) In panel summaries?</p> <p>c) In Program Officer review analyses?</p> <p>Comments:</p> <p>The COV noted that individual reviewers' attention to both merit review criteria was uneven. While some reviewers were thorough and explicit, others restated the objectives of the grant with little attention to the merit review criteria. However, panel summaries and Program Officer review analyses addressed the merit review criteria with increasing effectiveness.</p>	YES (WITH QUALIFICATION)

¹ If "Not Applicable" please explain why in the "Comments" section.

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<p>3. Do the individual reviewers provide substantive comments to explain their assessment of the proposals?</p> <p>Comments:</p> <p>The quality and substance of individual reviews varied from highly informative to brief and lacking in detail and substance. The informative reviews were considered beneficial to the PIs while those lacking in detail were found to be less useful. In some cases, the COV felt that the proposal ratings and reviewer comments were not well aligned.</p> <p>On occasion, the substance of the reviews indicated a lack of understanding on the part of the reviewers as to how to address the criteria for intellectual merit and broader impact.</p> <p>The COV recommends that NSF provide panel members with more detailed information and expectations for developing the intellectual merit and broader impact sections. This information should be delivered in several formats and across time frames (e.g., webinar PowerPoint, delivery of review materials, beginning of panel meeting, etc.). The COV noted the existence of two PowerPoint presentations intended to deepen reviewers' understanding of how to provide an effective review and how to address the merit review criteria; a more timely and effective use of these presentations is encouraged.</p> <p>However, the COV cautions that the process should not become too prescriptive lest it diminish the independent perspectives of a diverse panel.</p>	<p>YES</p>
<p>4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)?</p> <p>Comments:</p> <p>There exists a range in the amount of detail across panel summaries, from highly informative in providing PIs with detailed information for clarity about the decision, to lacking in useful information that offers PIs a substantive rationale for the decision and potential improvement of the proposal.</p> <p>The COV recommendation previously mentioned in section A.1.3 is expected to facilitate improvement in the quality of panel summaries.</p> <p>The COV recommends that panel summaries include information about the status of the proposal as highly competitive, competitive or not competitive.</p>	<p>YES</p>

<p>5. Does the documentation in the jacket provide the rationale for the award/decline decision?</p> <p>(Note: Documentation in jacket usually includes context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), program officer review analysis, and staff diary notes.)</p> <p>During FY 2009, NSF permitted reversal of a declined decision for funding through ARRA for proposals declined after October 1, 2008. (NOTE: This question does not apply to programs for which the reversal decline option was not used.)</p> <p>i) Were the reversals of the decision to decline based on both the high quality* of the reviews received on the initial submission and the lack of available funding at the time the origin was made?</p> <p>*Rated "Very Good or above" or the functional equivalent by review panels.</p> <p>ii) Is documentation provided, including a revised Review Analysis, to support the award decisions?</p> <p>Comments:</p> <p>Rationales for the decisions are provided. The quality of the rationales offered in panel summaries and individual reviews are not always consistent. While some reviewers offer clear rationales for decisions, others do not. However, Program Officer comments provide extensive and detailed information that provides a PI with a clear rationale for a decision.</p>	<p>YES</p>
<p>6. Does the documentation to PI provide the rationale for the award/decline decision?</p> <p>(Note: Documentation to PI usually includes context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), and, if not otherwise provided in the panel summary, an explanation from the program officer (written or telephoned with diary note in jacket) of the basis for a declination.)</p> <p>Comments:</p> <p>In most cases the documentation to the PI (individual reviews, panel summary and context statement) provides extensive and substantive discussion of the proposal's strengths, weaknesses and rationale for recommendation. In many cases the reviews and summary also provide suggestions for improving a competitive proposal. The COV feels that such suggestions are potentially very helpful to the PIs and should be included whenever possible. There were some cases, however, in which reviews, and less often summaries, did not provide a clear rationale for the decision. This was often related to the quality of the reviews overall. Increasing the quality of reviews will likely enhance the utility of the information provided to PIs.</p>	<p>YES</p>

<p>7. Is the time to decision appropriate?</p> <p>Note: Time to Decision --NSF Annual Performance Goal: For 70 percent of proposals, inform applicants about funding decisions within six months of proposal receipt or deadline or target date, whichever is later. The date of Division Director concurrence is used in determining the time to decision. Once the Division Director concurs, applicants may be informed that their proposals have been declined or recommended for funding. The NSF-wide goal of 70 percent recognizes that the time to decision is appropriately greater than six months for some programs or some individual proposals.</p> <p>Comments:</p> <p>Overall, the time to decision was appropriate; 74% of proposals had decisions within six months. The timeliness of Program Officer follow-up and communications with PIs is commended by the COV.</p>	<p>YES</p>
<p>8. Additional Comments</p> <ul style="list-style-type: none"> a) Additional comments on the quality and effectiveness of the program's use of merit review process. b) To what extent does the documentation in the jacket or otherwise available provide the rationale for use of ARRA funding? <p>Overall, the COV felt that the review process was equitable, thorough and adequate. In particular the review analyses prepared by the Program Officer, as well as the evidence of communication and negotiation with PIs, were impressive and suggested a careful, comprehensive and timely response to proposals.</p> <p>The reviews themselves, however, varied in quality and it seems that some reviewers could benefit from additional support and scaffolding in writing adequate reviews. The COV recommends that efforts be made to further educate reviewers through varied means (webinars, written materials, podcasts) prior to the convening of the panel.</p>	

A.2 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 ²
<p>1. Did the program make use of reviewers having appropriate expertise and/or qualifications?</p> <p>Comments:</p> <p>Review panels were comprised to provide a wide range of expertise, a notable accomplishment given the need to balance many areas of expertise with a limited number of reviewers per panel. However, some types of expertise were less well represented on panels. For example, only 5% of panelists had expertise in policy, and 28% had expertise in research design and methodology. The COV believes that these categories of expertise are highly relevant to the review of MSP proposals of all types and recommends that an attempt be made to include a higher proportion of reviewers with expertise in policy and research methodology. The COV noted the welcome and desirable increase of representation from K-12 settings from 13% in 2008 to 21% in 2010 and encourages continuous attention to maintaining this level of K-12 participation.</p> <p>The information regarding areas of expertise is based on voluntary self-reports and does not address reviewer expertise in terms of areas of research, and theoretical and methodological perspectives. This more detailed level of information was not available in the e-jacket system, and at times it was difficult to determine if a reviewer in a math or science department was primarily an expert in the discipline or in education of the discipline.</p>	<p>YES (WITH QUALIFICATION)</p>
<p>2. Did the program use reviewers balanced with respect to characteristics such as geography, type of institution, and underrepresented groups?</p> <p>Note: Demographic data is self reported, with only about 25% of reviewers reporting this information.</p> <p>Comments:</p> <p>Overall the panels were well balanced in terms of gender and geographical location. However, not all states were represented in panels (10 were not), and some states were only modestly represented (FL, IA, ID, MT, VT). Panels included a significant proportion of reviewers from underrepresented groups (21%), and this proportion may be even higher given that only 25% of reviewers provided such information. A large majority of the panelists were from institutions</p>	<p>YES</p>

² If “Not Applicable” please explain why in the “Comments” section.

<p>of higher education (79%); and only 5% were from two-year institutions. The representation from K-12 settings was relatively low (13%); however, there was an increase in the proportion of panelists from K-12 institutions during 2010 (21%). Similarly only 8% of the panelists were from other types of organizations and agencies (e.g., consultants, informal education settings, etc.). The COV recommends increasing the participation of faculty from two-year institutions.</p>	
<p>3. Did the program recognize and resolve conflicts of interest when appropriate?</p> <p>Comments:</p> <p>The program appropriately recognized and addressed conflicts of interest.</p>	<p>YES</p>
<p>4. Additional comments on reviewer selection:</p> <p>Overall, the specific expertise of reviewers was often unclear. The COV could not determine whether panels had sufficient expertise regarding policy, professional development, and research design and methodology. Such expertise is clearly relevant and necessary for the adequate review of many of the MSP proposals.</p>	

A.3 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 style="text-align: center;">RESULTING PORTFOLIO OF AWARDS</p>	<p style="text-align: center;">APPROPRIATE, NOT APPROPRIATE³, OR DATA NOT AVAILABLE</p>
<p>1. Overall quality of the research and/or education projects supported by the program.</p> <p>Comments:</p> <p>Some of the RETAs and all of Phase II projects have an explicit research component. Looking across the rest of the portfolio, the projects focus mainly on evaluation, rather than on research: documenting project activities, tracking number of participants and assessing student learning outcomes. An overall emphasis on learning outcomes is appropriate given the goals of the program.</p> <p>The COV identified two ways in which to strengthen the evaluation of models for supporting instructional improvement that are being implemented in MSP projects:</p> <p>First, most projects currently rely exclusively on state assessments when documenting student outcomes. Analyses that have been conducted of state assessments have revealed that most emphasize procedural fluency at the expense of conceptual understanding (Shepard, L.A., 2002) <i>The hazards of high-stakes testing. Issues in Science and Technology, 19, 53-58</i>). In addition, a 2004 report by Achieve, Inc. reviewing graduation exams from six states suggests that the tests sample a very narrow portion of knowledge and tend to focus on lower level reasoning skills and procedural knowledge. As a consequence, state assessments may not be well aligned with the ambitious goals for scientific or mathematical learning being pursued by MSP projects. However, it should be noted that over the past several years a number of states have revised their state assessments to reflect the goals of MSP projects. The COV recommends that, as needed, MSP projects supplement state assessments with a wider variety of assessments that give equal weight to procedural fluency and conceptual understanding. Assessments that have been nationally or internationally benchmarked would be especially useful, including items from NAEP, TIMMS, and PISA. In making this recommendation, the COV acknowledges that pursuit of the ideal often conflicts with the reality of schooling, particularly in a program that supports the development of genuine partnerships between school districts and colleges/universities. The requirement of an additional set of student assessments might impose an undue burden on some districts, particularly at the beginning of a partnership.</p>	<p style="text-align: center;">APPROPRIATE</p>

³ If “Not Appropriate” please explain why in the “Comments” section.

<p>Second, the COV suggests that the MSP program encourage projects to conduct theory-based evaluations of the models for supporting instructional improvement that they are implementing. Evaluations of this type make the rationale or program theory that underpins the model explicit and then measure the outcomes of key steps. For example, the program theory for a model for training teacher leaders in middle-grades science might specify what the teacher leaders are expected to learn during professional development (e.g., deeper knowledge of science content), their envisioned practices while working with teachers (e.g., modeling or co-teaching while working with teachers in their classrooms), and the expected improvements in teachers' instructional practices and in students' learning. While we acknowledge it is unreasonable to expect MSP projects to develop measures of the complex forms of practice that they seek to foster, we nonetheless assert that some projects might be able to develop measures of the outcomes of some steps in their program theories (e.g., of learning during and professional development). In addition, projects might employ measures of high-quality instructional practice that are being developed with funding from NSF and a number of private foundations.</p> <p>The MSP program aims to support sustainable improvements in K-12 science and mathematics teaching and in working relationships between scientists/mathematicians and educators. The goal has implications for the review process as supports for sustainability must be built into project designs from the outset rather than addressed as an afterthought. The COV was encouraged to see that a number of colleges/universities participating in funded projects have adjusted their tenure and promotion criteria to recognize the contributions of scientists and mathematicians to education. In addition, the COV noted instances in which the work of MSP projects has resulted in changes in state policies for science and/or mathematics education. The COV encourages continued emphasis on sustainability at all stages of the MSP projects.</p> <p>It is important that the findings of MSP projects be made accessible to a broad audience if they are to result in sustainable improvement at the district and state level. The proposals that the COV reviewed did not typically include a dissemination plan that involved communicating findings in forms that are accessible to practitioners and policymakers as well as researchers. Program staff appears to be aware of this issue and frequently pressed PIs to expand and elaborate their dissemination plans during negotiations on the scope of projects.</p>	
<p>2. Does the program portfolio promote the integration of research and education?</p> <p>Comments:</p> <p>The Phase II and some of the RETA projects have explicit research components that further their educational goals. In addition, the RETAs in the portfolio aim to develop tools and resources for use by other MSP projects.</p> <p>In the three years since the last COV, a concerted effort has been made to</p>	<p>APPROPRIATE</p>

<p>synthesize findings across MSP projects. The results of these initiatives have been fed back to MSPs and have resulted in a significant number of research publications. Future plans include a meeting of PIs/co-PIs of MSPs that are implementing professional learning community models to share experiences and findings. The COV anticipates that this effort to synthesize findings on an issue that is central to the program's mission and on which the current research base is thin will be particularly valuable. Similar meetings on issues such as high-quality teacher professional development, coaching/teacher leaders, and school instructional leadership in mathematics and/or science should also pay dividends.</p>	
<p>3. Are awards appropriate in size and duration for the scope of the projects?</p> <p>Comments:</p> <p>The wide range in the size of awards reflects the variation in the goals of projects that have been funded. The program staff appears to have a good feel for appropriate levels of funding and enters into extensive budget negotiations with PIs. The addition of MSP-Starts that receive lower levels of funding has strengthened the integrity of the program while encouraging the participation of minority-serving institutions.</p> <p>The program continues to fund Institute grants at approximately \$1 million per year in this era of decreasing program budgets. The COV supports the decision to fund a smaller number of large projects at adequate levels. A strong argument can be made for extending the duration of larger projects beyond five years given that the MSP program aims to support sustainable change at scale. However, the COV recognizes that this might not be feasible in the current funding climate.</p>	<p>APPROPRIATE</p>
<p>4. Does the overall program portfolio (including ARRA funded awards) have an appropriate balance of innovative/potentially transformative projects?</p> <p>ARRA Specific Question: Does the ARRA funded portfolio have an appropriate balance of innovative/potentially transformative projects?</p> <p>Comments:</p> <p>The goal of building on current research to bring about sustainable improvements in science and mathematics teaching by forging partnerships is ambitious and involves overcoming a number of significant challenges. For the purposes of this review, the COV therefore considered it appropriate to define transformative projects as those that are likely to transform the local context either of science and mathematics teaching, or of relationships between scientists/mathematicians and educators. With respect to this criterion, MSP projects aim to transform long-established institutional norms in the participating colleges and universities. In addition, a significant proportion aims to transform the capacity of participating schools and districts to support improvements in the quality of science and/or mathematics teaching, and student learning. The COV identified a number of projects as</p>	<p>APPROPRIATE</p>

<p>innovative. Time will tell if they also are transformative.</p> <p>With respect to the NSF definition (bulletin 130), however, there do not appear to be individual projects that have the potential to significantly transform the fields of educational reform or STEM professional development and instruction. Again, the COV recognizes the magnitude of the challenges to systemic and sustainable educational reform in K-12 or higher education and would be surprised to find projects with this potential. However, the COV believes that the MSP program (i.e., the collection of all MSP projects) has the potential to transform mathematics and science education or at least some fundamental parts thereof.</p>	
<p>5. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Inter- and Multi- disciplinary projects? <p>Comments:</p> <p>The COV noted that the vast majority of MSP projects did interrelate one or more content disciplines with the discipline of educator development/educational research. In this sense most projects were interdisciplinary.</p> <p>The COV made a distinction between interdisciplinary projects, in which content disciplines interact and mutually inform each other, and multidisciplinary projects, which focus on multiple disciplines but the disciplines do not interact or inform each other. Given that distinction, the COV found that most of the projects in the portfolio were more likely to be multi- rather than interdisciplinary, with the exception of one project that integrated science and literacy. The COV suggests that future priorities should encourage more interdisciplinary projects.</p>	<p>APPROPRIATE</p>
<p>6. Does the program portfolio have an appropriate balance considering, for example, award size, single and multiple investigator awards, or other characteristics as appropriate for the program?</p> <p>Comments:</p> <p>The COV found that overall the program portfolio had an appropriate balance in terms of award size and multiple investigator awards. The COV noted that range of awards sizes was appropriate and clearly tailored to the different projects funded by the portfolio (e.g., Targeted grants were larger than MSP-Starts). The COV's review of the negotiation process indicated that POs were cognizant of the funding necessary to complete particular proposed projects and worked with PIs to adjust budgets upwards or downwards according to the scope of work within those projects.</p> <p>Similarly, the COV concluded that the program portfolio was appropriately balanced on the side of multiple investigator awards. The very nature of the MSP program dictates that there are no single investigator awards; thus, all partnerships in the program portfolio are multiple investigator awards. The COV noted that, among the sample of proposals reviewed, there was a range</p>	<p>APPROPRIATE</p>

<p>of three to 10 or 12 co-PIs, with the majority of proposals having four to five PIs. The majority of the PIs came from higher education with a significantly smaller proportion coming from K-12 partners.</p>	
<p>7. Does the overall program portfolio (including ARRA funded awards) have an appropriate balance of awards to new investigators?</p> <p>ARRA Specific Question: Does the ARRA funded portfolio have an appropriate balance of awards to new investigators?</p> <p>NOTE: A new investigator is defined as an individual who has not served as the PI or co-PI on any award from NSF (with the exception of doctoral dissertation awards, graduate or postdoctoral fellowships, research planning grants, or conferences, symposia & workshop grants.)</p> <p>Comments:</p> <p>The COV concluded that the number of new PIs was appropriate for the MSP program, representing 13.9% of the PIs across the entire portfolio, 24.1% of PIs in the MSP-Start program, and 33% (three of nine) in the ARRA funded portfolio. Clearly the COV would expect the proportion of new PIs to be higher in the MSP-Start projects.</p> <p>The COV did wonder how many of the co-PIs across the portfolio were new to the NSF given the large number of co-PIs participating in MSPs. However, given the way that data is collected in the NSF's EIS database, these data were not available. It is likely that the percentage of new co-PIs is greater than that of new PIs, especially given the number of school district partners in the portfolio.</p>	<p>APPROPRIATE</p>
<p>8. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Geographical distribution of Principal Investigators? <p>Comments:</p> <p>The COV examined maps that presented the distribution of submitted and funded MSPs across different states. Institutions in every state with the exception of North Dakota and Wyoming submitted at least one MSP proposal, with more populous states such as California, Texas and New York submitting the greatest number of proposals.</p> <p>The number of funded proposals within that same period was distributed across the U.S., and although there were regions in which institutions did not receive funding during the period of review (part of the Southwest, North Central states, and Southeast). Comparisons with the geographical distribution of awards made prior to 2008 indicate either that MSPs had previously been awarded to institutions in these states, or that institutions in these states are partnered with MSPs in other states (i.e., Wyoming and Colorado).</p>	<p>APPROPRIATE</p>

<p>9. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Institutional types? <p>Comments:</p> <p>The COV noted that, compared to the 2008 report, a greater range of institutional types had been funded during the period of review. The majority of proposals were submitted by master's and research-intensive institutions. However, projects awarded were balanced across institutional types, indicating that MSP staff had made a clear effort to address this issue.</p> <p>The COV was greatly encouraged by the progress the MSP program did make in going from zero awards to historically black colleges and universities (HBCUs) in the years prior to the COV to five of the eleven awards made to HBCUs during the COV period. However, the COV did note a drop-off in the number of grants awarded to HBCUs during the COV period, from five funded in 2008 to zero funded in 2009. Program staff have tried to address this issue by holding workshops for potential PIs through the Quality Education for Minorities (QEM) Network and by introducing MSP-Start awards. It could be the case that awards were made to the strongest HBCUs in earlier rounds of funding. Regardless, the COV encourages the MSP staff to review their strategies to ensure that all minority-serving institutions are provided with the needed and appropriate technical assistance to develop and submit a proposal to the program.</p>	<p>APPROPRIATE</p>
<p>10. Does the program portfolio have an appropriate balance:</p> <ul style="list-style-type: none"> • Across disciplines and subdisciplines of the activity? <p>Comments:</p> <p>The 2008 COV review noted that there were proportionally more mathematics- than science-focused MSPs. In contrast, proportionally more awards were made for science- than for mathematics-focused MSPs in the period reviewed by this COV.</p> <p>The COV noted that there are few engineering-focused MSPs and encourages a greater focus on engineering, as this is an underserved but important area with respect to educational research and K-12 schools.</p>	<p>APPROPRIATE</p>
<p>11. Does the program portfolio have appropriate participation of underrepresented groups?</p> <p>Comments:</p> <p>It was clear to the COV that a high proportion of the proposals reviewed prioritized serving underrepresented groups, and that review panels and POs evenly applied this criterion when evaluating the merit of proposals.</p> <p>The data provided by the NSF indicate that individuals in underrepresented groups are participating in the MSPs. With respect to university partners, 11</p>	<p>APPROPRIATE</p>

<p>of 53 grants were given to minority-serving institutions.</p> <p>Of the K-12 schools served by the grants, 33.7% were located within urban areas and 25.4% were located in rural areas. Furthermore, 21.9% of the students served by the program portfolio were African American and 24.8% were Hispanic. All of these K-12 statistics are above the national distribution, indicating that the MPS program is actually serving students in these underrepresented areas and groups in greater numbers than would be expected.</p>	
<p>12. Is the program relevant to national priorities, agency mission, relevant fields and other constituent needs? Include citations of relevant external reports.</p> <p>Comments:</p> <p>The COV concluded that the MSP program was very relevant to national priorities, the fields of education and educational research, and identified needs of constituents. For example, PCAST's <i>Report to the President Prepare and Inspire: K-12 Education in Science, Technology, Engineering and Math (STEM) for America's Future</i> argues that the achievement gap in mathematics and science poses a great risk to the future competitiveness of the nation. The MSP explicitly focuses upon funding projects that serve students in underrepresented groups in order to narrow the achievement gap. Similarly, the report emphasizes the need to recruit and train 10,000 new mathematics and science teachers. Clearly, the mission of the MSP program to partner mathematics and science teachers with university-based scientists for the purpose of developing leadership capacity and increasing teachers' content and pedagogical knowledge is aligned with this goal as well.</p> <p>In addition, the MSP program is aligned with and positioned to support the research in a number of NRC reports including <i>Taking Science to School, Ready, Set, Science!</i>, <i>How Students Learn</i> and <i>Preparing Teachers</i>, as well as the common core mathematics standards, the next generation of science standards and the new state assessments.</p> <p>A number of the NRC reports as well as the recently released NRC draft, A Conceptual Framework for the Next Generation Science Education Standards, emphasize the role of learning progressions in guiding the design of standards, curriculum, and assessments of student learning, and a range of instructional approaches. The COV noted that some of the later funded MSP's give explicit focus to learning progressions.</p> <p>Furthermore, many of the MSPs reflect the current national policy priorities as evidenced by the Race to the Top program, namely issues of teacher quality, teacher education and STEM educator development, and the development and implementation of new state mathematics and science standards.</p>	<p>APPROPRIATE</p>

13. Additional comments on the quality of the projects or the balance of the overall portfolio (including ARRA funded awards).

ARRA Specific Comments: Additional comments regarding the portfolio of ARRA awards addressing the NSF or program-specific priorities for ARRA funding?

Comments:

The COV did not have additional comments beyond the fact that the ARRA awards appeared to have undergone an expedited review process as compared to the rest of the MSP awards, and in at least one case a very short review analysis had been written as compared to the thorough analyses written by POs for the other awards.

A.4 Management of the program under review. Please comment on:

1. Management of the program.

Comments:

The COV notes that MSP staff managed the project with clear goals in mind throughout the COV period (see additional comments regarding strategic planning in section A.4.3 below). MSP staff clearly aligned their work with the NSF strategic plan (as seen in management plans) and purposefully made decisions about MSP program design and solicitations with key goals in mind, as evidenced in solicitations, documentation and comments provided during the COV review. Such decisions have led to the addition of new grant types that assist the MSP program in achieving particular purposes (for example, the MSP-Start grants encourage new PIs and institutions). In addition, some cross-division funding was negotiated where common goals and initiatives aligned. MSP staff provided a clear focus on evaluation, research and dissemination through the COV period. Data collected throughout the COV period and summarized in annual reports include relevant metrics aligned with program goals. The COV applauds the development of the Management Information System to collect, analyze and disseminate data and findings of the MSP program.

Through evidence gleaned from the e-jacket materials, the COV notes the attention of Program Officers to developing and maintaining productive relationships with PIs. MSP Program Officers clearly were attentive to the requirements of the MSP program and consistently were in communication with the PIs. The communications were frequent, detailed, thorough, and supportive of the PIs many roles. Starting with proposal reviews, the Program Officers clearly built on reviewer and panel recommendations, and additionally added a greater level of thoroughness and detail when communicating with the PIs.

The program was timely in making and communicating award/decline decisions, with over 70% of decisions being made within six months (with one exception in 2009 when the White House and Congress were determining ARRA budget additions). Once awarded, projects were required to submit annual reports with detailed strategic and evaluation plans.

The COV had difficulty in assessing the level of staffing and coordination for effective management of the program. A list of individuals who have some level of MSP responsibility was provided, which shows a range of staff with a diverse background and experience base that contributes to successful management of the program. The range of responsibilities, however, of each staff member across different programs varies greatly, making it difficult to assess the overall capacity for effective management. With that said, as noted in other portions of this report, there is clear evidence that the MSP staff is effectively carrying out the many elements of the program (from proposal reviews and awards to compliance and oversight, with additional responsibilities for organizing conferences, program evaluation, dissemination of program findings, etc.).

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

Comments:

The COV notes the design and awarding of RETA grants during the COV period that focused on particular emphases aligned with key research and education opportunities. These foci included: assessment tools, longitudinal studies and inclusion of professional societies in 2008; research on student impact and teacher learning in 2009; and instrument development and technical assistance

in 2010. Some of the efforts of the annual learning conferences and the MSPnet dissemination also focused on looking across a variety of projects to synthesize findings of particular professional development models. Finally, the MSP staff continually gathered and reflected on feedback provided from federal stakeholders, partnership members and program evaluators on emerging needs and opportunities. The creation of the Phase II grants was in response to this type of feedback in particular, allowing for longer-term research of focused and important questions that were not possible in the timeframe of Targeted grants.

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

Comments:

As noted in section A.4.1, the COV commends MSP staff for clearly aligning their work with the NSF strategic plan (as seen in management plans) and purposefully making decisions about MSP program design and solicitations with key goals in mind. Over the COV period, MSP staff regularly convened to ensure goals were being met and adjustments were made to enhance the portfolio of projects. Decisions to include new grant types during the COV period greatly diversified the portfolio of projects (particularly MSP-Start and Phase II grants). The particular focus given to RETA grants in each solicitation demonstrated program awareness and attention to strategic needs. MSP staff also collaborated with other divisions and entities (such as the U.S. Department of Education) to inform planning and development. As noted in section A.4.2, MSP staff regularly gathered and reflected on feedback provided from federal stakeholders, partnership members and program evaluators to guide program planning and the development of the program portfolio.

The COV commends the MSP program on the implementation of MSP-Start grants as a mechanism for involving new PIs and a broader range of institutions (such as community colleges) into the program. This COV is encouraged that several of these MSP-Start grantees have subsequently applied for Targeted or Institute grants. The COV also acknowledge the success of the QEM workshop in increasing the number of proposal submissions from diverse institutions and researchers, a submission rate of more than 60% according to one QEM annual report. Again, multiple QEM workshop participants have submitted proposals for the 2010 solicitation. The COV did note, however, the declining numbers of participants in the QEM workshop over the COV period. It therefore seems important to assess the value of this strategy as a vehicle to increase participation.

Over the course of the COV period, the MSP program has demonstrated a concerted effort to diversify funding to a range of grant types and foci, a range of states, institution types, and the diversity of PIs and teacher/student populations. There was clear attention to the five key features of the MSP program in each proposal or project. These key features provided a lens or framework for assessing proposals, which when taken with additional considerations for funding, allowed for thoughtful funding decisions. This was particularly important given the limited funding over the COV review period. MSP staff communicated their purposeful decision to fund fewer but bigger projects, rather than many smaller projects, to ensure the quality of research and development achievements. The MSP program has also been proactive in pursuing purposeful cross-division funding where complementary interests exist (e.g., with the Noyce Scholarship, Engineering Education and Geoscience Education programs).

4. Responsiveness of program to previous COV comments and recommendations.

Comments:

The COV recognizes the concerted attention and responsiveness of MSP staff to the 2008 COV report and recommendations. This is evidenced through both staff responses to the 2008 COV report (the 2008 response and the 2011 updated response), the changes to the MSP solicitations during 2008-2010 period, including additional grant types and changes to PI criteria, and the effort to the synthesis of MSP findings and their dissemination. Additionally, there is extensive evidence of MSP staff assistance to reviewers (guidance documents, orientation webinars, etc.), to proposers (panel reviews and correspondence in e-jacket materials), and in the preparation of this COV panel.

5. Additional comments on program management:

The COV was also highly impressed with and very appreciative of the careful and thorough preparation of materials for the COV review process.

PART B. RESULTS OF NSF INVESTMENTS

The NSF mission is to promote the progress of science; advance national health, prosperity, and welfare; and secure the national defense (NSF Act of 1950).

In this Section, the COV is asked to comment on (1) noteworthy achievements based on NSF awards in the portfolio under discussion; (2) ways in which funded projects have collectively affected progress toward NSF's mission and the strategic outcome goals of Discovery, Learning, and Research Infrastructure; and (3) expectations for future performance based on the current set of awards.

NSF investments produce results that appear over time. Consequently, the COV review may 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.

In addition to identifying particularly noteworthy accomplishments or "highlights," the COV is encouraged to comment on the impact of NSF supported contributions to the field. For example, the COV report may include comments on NSF supported work in context of contributions to advance a field, impact of NSF investments to stimulate emerging new areas, and potential for transformative impact in research or education.

To assist the COV, NSF staff will provide award "highlights" as well as information about the program and its award portfolio. The COV is asked to use this information, members' own knowledge of the field, and other appropriate information to develop its comments for this section.

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

B.1 OUTCOME GOAL for Discovery: "Foster research that will advance the frontier of knowledge, emphasizing areas of greatest opportunity and potential benefit and establishing the nation as a global leader in fundamental and transformational science and engineering."

This category includes NSF's disciplinary and interdisciplinary research in science and engineering, education research, and centers.

Comments:

The COV judges that MSP projects are advancing the frontier of knowledge in mathematics and science education and believes the program has the potential to make significant future contributions. Each funded project includes a full evaluation component. Many of the current projects, especially Targeted and Phase II grants, also include research components, and research results from MSP projects are now appearing in refereed journals and other publications. The development of the RETA program to create new research tools and methods has been an important addition as has been the development of the Phase II grants which provide support for deep investigation of questions that arise from earlier work.

Syntheses of what is being learned from MSP projects will be a critical step going forward. The work

of COSMOS is one example of what is needed. The COV was pleased that funding for work to synthesize research, and also to measure long-term impact, is expected to continue and that there will continue to be strong dissemination efforts to get what is learned, especially from promising programs, to those who need and can use this information. The COV found the current electronic and print knowledge management and dissemination efforts impressive. The Learning Network Conferences and the conferences sponsored with the Department of Education show signs of reaching new audiences.

The COV recognizes that the research base to inform the creation of MSP partnerships is inadequate in many ways. For example, the current research base on professional learning communities, content-focused coaching/teacher leaders, and school instructional leadership in science and mathematics is in its beginning stages. That said, the COV is concerned that some MSP proposals do not acknowledge gaps in the research base or reference the existing relevant research and indicate how the project intends to build on what is already known. It was common in the proposals that the COV reviewed for proposers to appeal to authority rather than evidence by citing recommendations of professional organizations such as the National Association for Research in Science Teaching (NARST) or the National Council of Teachers of Mathematics (NCTM). This matter can be addressed both in the expectations set by RFPs and in the review process. The COV also notes that the MSP program is well positioned to address some of the gaps in the current literature. In this regard, plans for a meeting of PIs/co-PIs who are implementing professional learning community models to synthesize findings are timely. Similar meetings on issues such as high-quality teacher professional development, coaching and school instructional leadership in mathematics and/or science might also pay dividends.

B.2 OUTCOME GOAL for Learning: “Cultivate a world-class, broadly inclusive science and engineering workforce, and expand the scientific literacy of all citizens.”

This category includes K-12, undergraduate, graduate, and postdoctoral education and training; public understanding of science; and lifelong learning.

Comments:

Urban school districts are heavily represented in MSP projects. There have also been strong efforts to engage minority-serving institutions. The new MSP-Start program has attracted more of these institutions as well as some community colleges. The result of these efforts is a collection of high-quality projects that contribute in a variety of ways to developing a well-educated and inclusive workforce and a more scientifically literate public.

Student achievement for students taught by teachers in MSP programs has made positive gains, especially at the elementary and middle school levels. Gains for minority students are impressive as are gains for female students. However, as noted in A.3.1 student achievement in MSP projects is generally measured by state achievement tests, and there is recognition that these data, although important, do not answer all the questions that need to be addressed about the impact of MSP programs on student learning. The COV is hopeful that the alignment between state assessments and the goals of MSP projects for student learning will improve after the majority of states have transitioned to the Common Core State Standards in Mathematics and the Next Generation Science Education Standards. Even so, the COV notes that there is more to be learned about the impact of the MSP program on student learning than can be revealed by standardized state assessments. Finding ways to undertake investigations that extend beyond scores on state tests should be a priority. The COV recognizes that such investigation is challenging, requires longer time frames, and would not be possible for all MSP projects.

B.3 OUTCOME GOAL for Research Infrastructure: “*Build the nation’s research capability through critical investments in advanced instrumentation, facilities, cyberinfrastructure and experimental tools.*”

This category includes facilities, research instrumentation, and cyberinfrastructure.

Comments:

There is clear evidence that the MSP program is strengthening the research infrastructure in mathematics and science education, primarily by building social capital between researchers and practitioners, and within the research community. New partnerships between higher education and schools/districts are being developed; research scientists and mathematicians are being linked with educators at their own and other institutions. These connections have the potential to change expectations and culture about who can legitimately engage in education research and how it will be conducted. Additional studies are needed to learn what each party contributes to successful partnerships and to identify the factors that differentiate successful partnerships from those that are less successful.

PART C. OTHER TOPICS

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

The COV notes that the MSP program has addressed many issues brought forward by prior COVs.

One issue that appears to be in the interest of the entire program would be an external assessment of the entire portfolio of the MSP program: to identify what systemic outcomes, components and models emerge as leading contenders for widespread dissemination and implementation. The COV recommends consideration of an effort to conduct this assessment, with a view to providing feedback for future funding directions as well. This could involve, for example, the development of a knowledge base on teacher development and sustainability models.

The COV encourages investigation of the validity of using standardized test improvement as the only indicator of effectiveness of individual program projects in order to guard against false success indicators for interventions simply caused by attention being focused on the issue (i.e., the Hawthorne effect).

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.

In the COV's view, NSF should be commended for encouraging and helping to create connections between institutions of higher education and K-12 programs. The COV also believes that the sustainability of such connections is of import to U.S. education. These partnerships can be a vehicle for cultural changes within each of these two entities, as well as between them. The COV is concerned about the sustainability of such connections, and recommends study of the elements that lead to sustainability beyond the end of the MSP grant period. The COV believes this goal of sustainability is laudable but very challenging.

It appears to the COV that the MSP program is producing important and useful results. Some additional roadmaps for potential users might be helpful to make these results more easily accessible. We applaud the extra efforts at dissemination already extant within the MSP program, via journal publications and, books and MSPnet. The COV recommends additional efforts to develop guides for the results and consideration of other channels for communication; perhaps a vehicle like MSPnet for practitioners nationwide could be created.

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

The quality of reviews is always a matter attracting some attention and it is not always clear how a panel comes to a final decision and recommendation. Additional mechanisms for achieving greater uniformity in aligning reviewers' comments with their designated scores would be useful to consider.

The COV applauds the strong efforts of the MSP program to coordinate with the Department of Education through regular meetings that promote the exchange of information and responsibility. The MSP program would be aided in these communications if it had an analysis of those programs that have proven to be valid and sustainable, as indicated above.

As mentioned above in A.3.9, A.3.11 and A.4.3 with regards to broadening participation, the MSP program has done a notable job in providing access to and workshops about the program to

minority-serving institutions. A more generic question that does not seem to be addressed in the MSP program, or anywhere else in NSF to our knowledge, is whether the interventions and techniques being used work equally well for schools that serve particular ethnic or socioeconomic groups, or whether some techniques work better for some subcultures than others. This could be increasingly important for the STEM workforce of the future as minority and disadvantaged populations increase.

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

No additional comments noted.

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

The COV commends the MSP staff for the excellent job in providing materials to the COV in a thorough and timely fashion. The annotated report template was very useful.

Additional Program Specific Questions

C. 6. In what ways do you find the MSP construct of Partnership to be most useful to advancing the teaching and learning of STEM disciplines?

The COV believes that the construct is very useful and important. More information on the structures of partnerships that work well should be developed. Perhaps the MSP should require that the grantee develop a plan with expectations on how the partnerships will be sustained. Again, more synthesis of the MSP results on this topic should be done to help those wanting to implement the construct.

C.7. Given your understanding of the MSP endeavor to date, as well as the national context of STEM education, are there areas that you would encourage the MSP program to stimulate, through future solicitations, in order to effect partnerships that could provide evidence-based information for where STEM education should be in 2021?

Some elements the COV would like to note here are included in responses to earlier questions, for example, promoting scale-up and dissemination of professional development models, disseminating and communicating results, and developing additional student achievement measures. The COV encourages the MSP program to analyze and synthesize the outcomes from various projects. Comparison of MSPs can help the field identify structures, processes, and strategies that lead to strong outcomes. The COV was pleased to learn of the strong collaboration already underway with the Department of Education and recommends the strengthening of that collaboration as well as joint funding of projects related to MSP developments.

In addition, the COV recognizes that the MSP program can play a supportive role in the implementation of new mathematics (Common Core) and science (Next Generation) standards. Teacher development around unique or new aspects of these standards will be critical to their successful implementation. For example, the mathematics standards will require significantly more application of particular mathematics concepts, implying a need for more explicit connections to science disciplines, which the MSP program is uniquely positioned to stimulate. In another example, the science standards will explicitly integrate practice and concepts aligned to particular core ideas, implying strong professional development models that help teachers understand progressions of learning and disciplinary knowledge that allows them to successfully engage students in a more dynamic set of expectations.

Additional areas that the MSP program could promote/stimulate:

- Implementation of learning progressions in STEM teacher development, curriculum and instruction, and assessment;
- Provide models for improving test scores in ways that value and encourage good teaching; and
- Develop tools to assess and promote STEM educator effectiveness, not in the evaluation context, but in the context of identifying and using tools to promote effectiveness.

The COV encourages funding of additional partnerships that focus on engineering. Given the potential increased attention to engineering in K-12 as suggested by the Conceptual Framework for the New Science Education K-12 Standards, it will be necessary to develop effective teacher professional development, instructional materials, assessments, and school structures to support the teaching of engineering. MSP's can play a vital role in proving new models to attain this goal.

SIGNATURE BLOCK:

Math and Science Partnership Program COV
Carlo Parravano, Chair