

FINAL REPORT
10/28/2008 11:30 AM
CORE QUESTIONS and REPORT TEMPLATE
For
FY 2008 NSF COMMITTEE OF VISITOR (COV) REVIEWS

Guidance to NSF Staff: This document includes the FY 2008 set of Core Questions and the COV Report Template for use by NSF staff when preparing and conducting COVs during FY 2008. 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 <www.inside.nsf.gov/od/oia/cov>.

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 results generated by awardees have contributed to the attainment of NSF's mission and strategic outcome goals.

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

Suggested sources of information for COVs to consider are provided for each item. As indicated, a resource for NSF staff preparing data for COVs is the Enterprise Information System (EIS) –Web COV module, which can be accessed by NSF staff only at <http://budg-eis-01/eisportal/default.aspx>. In addition, NSF staff preparing for the COV should consider other sources of information, as appropriate for the programs under review.

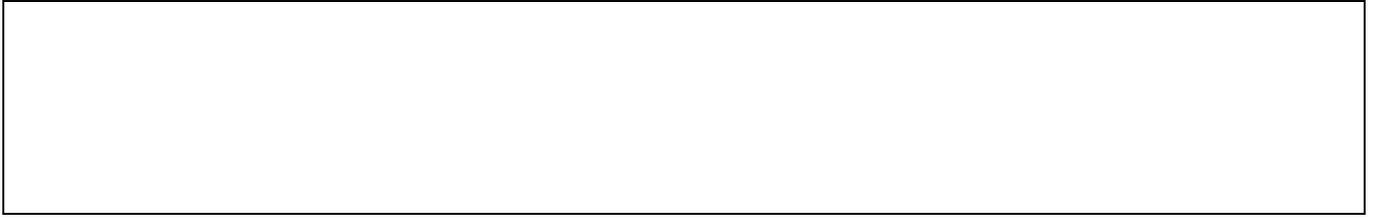
Guidance to the COV: The COV report should provide a balanced assessment of NSF's performance in two primary areas: (A) the integrity and efficiency of the **processes** related to proposal review; and (B) the quality of the **results** of NSF's investments that appear over time. The COV also explores 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. 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. For past COV reports please see <http://www.nsf.gov/od/oia/activities/cov/covs.jsp>.

FY 2008 REPORT TEMPLATE FOR NSF COMMITTEES OF VISITORS (COVs)

The table below should be completed by program staff.

Date of COV: 5/5-6/08
Program/Cluster/Section: Math and Science Partnership (MSP) Program
Division: Office of the Assistant Director, Education and Human Resources (EHR)
Directorate: EHR
Number of actions reviewed:
|Awards: <u>19</u>
|Declinations: <u>20</u>
|Other: <u>None</u>
Total number of actions within Program/Cluster/Division during period under review:
|Awards: <u>89</u>
|Declinations: <u>99</u>
|Other: <u>None</u>
Manner in which reviewed actions were selected:
<p><u>To gain a different random sample and retain the same sample size i.e., 25% of all active awards from 2002-2007, and to draw equally from each class of MSP projects i.e. Comprehensive, Targeted, Institute and RETA awards. The following sampling methods were used.</u></p> <ol style="list-style-type: none"> 1. <u>MSP Partnership Awards Random Sample FY 2002-2007</u> <ol style="list-style-type: none"> a. <u>Sample is 25% of total partnership awards</u> b. <u>Counted off in fours and then took all #3s</u> 2. <u>MSP RETA Awards Random Sample FY 2002-2007</u> <ol style="list-style-type: none"> a. <u>Sample is 20% of total RETA awards</u> b. <u>Counted off in fives and then took all #4s</u> 3. <u>MSP Random Sample Declinations FY 2005-2007</u> <ol style="list-style-type: none"> a. <u>Sample is 20% of total declinations FY 2005-2007</u> b. <u>All proposals ending in 3 or 5</u>



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>Variety and range of review methods are appropriate and comprehensive.</p> <p>The site visits are valuable and informative. They help guide future directions for funded projects and aid appropriate decisions about discontinuing projects on performance.</p> <p>Source: Jackets and the EIS. Select the “Type of Review” module.</p>	YES
<p>2. Are both merit review criteria addressed</p> <p>a) In individual reviews? Yes</p> <p>b) In panel summaries? Not always.</p> <p>c) In Program Officer review analyses? Yes</p> <p>Comments:</p> <p>Sometimes the panel summaries are well done and extensive; occasionally the criteria are marginally addressed.</p> <p>Source: Jackets</p>	YES

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

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE²
<p>3. Do the individual reviewers provide substantive comments to explain their assessment of the proposals?</p> <p>Comments:</p> <p>Comments range from being substantive to very brief and sometimes do not support the panel's rating. Some reviewers give outstanding reports by documenting their views with reasons and providing suggestions for improvement. Other reviewers offer comments that provide less guidance in support of their rating. Proposers benefit more from a critical and explicit review.</p> <p>The COV suggests paying close attention to the quality of the reviewers' comments to make sure they're helpful to both the PIs and the POs.</p> <p>Source: Jackets</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>Panel summaries range in quality with some being short and general and others providing more detail. Individual panelists and panel summaries show improvement over the previous cycle of awards from 2002-2005 in their consideration of the NSF's two review criteria – intellectual merit and broader impacts. Evaluations of broader impact are more specific than in previous years.</p> <p>While panel summary comments address the two criteria, they could be constructed to provide a clear rationale for the recommendation. Panel summaries are not uniform in their level of detail.</p> <p>The NSF needs to address inconsistencies in the panel summaries -- extensive explanations of strengths and weaknesses vs. vague references. Redesign the summary section so that reviewers provide adequate feedback to submitters and address the two criteria.</p> <p>Source: Jackets</p>	<p>YES</p>

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

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE ¹
<p>5. Does the documentation in the jacket provide the rationale for the award/decline decision?</p> <p>(Note: Documentation in the 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>Comments:</p> <p>Overall, PO comments in the examined jackets are complete and analytical; however, documentation in the jacket may or may not provide a clear rationale for the decision to award or decline because the rationale is not always clear from individual or panel summaries. When no “PO Comment” is available, PI may not be able to see a rationale for the decision.</p> <p>Source: Jackets</p>	YES
<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>When “PO Comments” are provided, they give the PI a very clear rationale for the decision. When there are no “PO Comments” and the panel summary is inadequate or not well written, the PIs may not see a clear rationale for the decision. The panel summaries are uneven. The goal should not be to write long summaries but to provide ones that capture the discussion and are complete.</p> <p>Source: Jackets</p>	YES

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

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE ¹
<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>For the years of 2005 and 2006 all decisions were made within six months. In 2007, 94% of all decisions were made within six months, and the rest within the next three months for a total of nine months to make the decision. The COV deems this time appropriate since it gives PIs time to review the proposal for re-submission.</p> <p>Source: Jackets and EIS-Web COV module. Select "Report View", then select "Average Dwell Time," and select any combination of programs or program solicitations that apply.</p>	YES
<p>8. Additional comments on the quality and effectiveness of the program's use of merit review process:</p> <p>Comments:</p> <p>The PO's may provide guidance to the NSF in the reviewer selection process by "grading" the reviewers based on the usefulness of their reviews. This practice may help to select better reviewers.</p> <p>Based on our review of site visit reports there is a disproportion of the quality and the substance of those visits. We recommend that key program components consistently be addressed across site visit reports. Currently reports do not seem to focus on the targeted aspects across projects.</p> <p>Source: Jackets</p>	YES

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

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>Reviewers appear to have content knowledge; however, the process seems to lack reviewers with a methodological background who can better judge some critical aspects of the proposals. More emphasis appears to have been placed on reviewers who have an expertise in content rather than in research, evaluation and methodology.</p> <p>Source: Jackets</p>	YES
<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 are self reported; only about 25% of reviewers reported this information.</p> <p>Comments:</p> <p>OVERALL REVIEWING: For the overall proposal review there is an attempt at balance. In reviewing individual proposals, it is unclear whether reviewers are balanced by institution type or by minority representation. It would be helpful to give specific proposal reviewers the option to report gender, minority status and disability status.</p> <p>Although there appears to be a good mix of reviewer types – school, university scientists, education faculty, and industry – and although some panels have a good mix, several panels appear to be dominated by faculty from universities. It is difficult to see if faculty has K-12 experience. Perhaps making an effort to have a mixed representation on all panels would yield desirable results.</p> <p>NUMBER OF PROPOSALS: In 2005, there were only 10 proposals with 5 states represented by the reviewers; by 2007 there were 118 proposals with 35 states represented by reviewers. As the number of proposals increased out of necessity, the number of reviewers increased.</p> <p>TYPES OF INSTITUTIONS REPRESENTED: The types of institutions cited are very unclear; 38% were unknown in 2007 creating a flaw in the NSF reporting</p>	YES

<p>system. No K-12 school system box was available to be checked.</p> <p>REVIEWERS: About 60% of the reviewers are university faculty; less than 30% are in the K-12 category for the year of 2006. It is feasible to have more K-12 teachers on panels.</p> <p>Underrepresented groups appear on the Review Minority Status Table 10. About 12% of minority information is unavailable making this figure inconsistent with the 25% stated above. Among those who identified themselves, about 29% of were minority.</p> <p>Data suggest a nearly balanced gender representation, yet approximately 11% did not specify their gender.</p> <p>The COV found missing, the information to determine the status of disabilities in the reviewer panels.</p> <p>Findings show that reviewers on any given proposal are not always balanced with respect to geography, type of institution and minority representation.</p> <p>Source: Jackets and EIS-Web COV module. The “Report View” has reviewers by state, institution type, minority status, disability status, and gender.</p>	
<p>3. Did the program recognize and resolve conflicts of interest when appropriate?</p> <p>Comments:</p> <p>From the sample of selected jackets, those panelists who reported COI for a particular proposal were not included as reviewers.</p> <p>Source: Jackets</p>	<p>YES</p>

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

4. Additional comments on reviewer selection:

Comments:

Obtaining information about the review process presents challenges because the codes are not explained on the e-jacket page. (Document 7). The specific affiliation of the individual reviewers often does not (especially when individuals retire) give an indication of how to classify them. Perhaps the system should include a category only for the current positions or the bulk of a person's career.

The reviewer panel may need to include more people with knowledge of psychometrics, methodology, and cognition.

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>The COV had difficulty determining the overall quality of the research-based projects given the data that were provided. The COV received a listing of MSP-PE manuscripts and publications covering the program; however, the COV did not receive a listing of published presentations or publications from individual projects.</p> <p>Very few manuscripts from the MSP-PE have been published. The Peabody Journal of Education will publish a series of nine manuscripts in an upcoming issue. This journal has six others under review. The COV could not find an explanation about why The Peabody Journal of Education constitutes the main source to disseminate the information. Without seeing the breadth and depth of information and data in the papers, it is difficult to provide a broader evaluation of the quality of the science and education that is part of the MSP program. The COV noted that dissemination of results from the MSP program is beginning to appear. While encouraging, it is too early to assess the full impact of the MSP program.</p> <p>The projects supported by the program are more extensively developed as "education projects" and are for support of the infrastructure of the partnerships. The research pieces that could be part of the projects have not been fully developed. A similar statement applies to evaluation and</p>	<p>DATA NOT AVAILABLE</p>

<p>assessment. Evaluation focuses mostly on tracking information (e.g., numbers of students and faculty involved) but there is much less information on the quality of the interactions that are part of the projects.</p> <p>MSP projects would benefit from a deeper assessment of student learning outcomes, an important aspect of the projects. The COV recommends identifying suitable approaches for developing valid and reliable assessments that tap different aspects of student learning and achievement in mathematics and science. Since the MSP program has been in operation for several years, more information is available about the strategies used to assess student learning and achievement across projects (e.g., types of assessments, types of items, types of knowledge tapped). Information may be easily shared and traced in such a way that new MSP projects can learn from other projects. The COV suggests sharing information across projects about the development and technical evaluation of the assessment approaches used to evaluate the impact of the interventions on student learning outcomes. If expertise on assessment, development and psychometrics is not found within the MSP team, the COV recommends placing a separate group with the necessary expertise in charge of this aspect of the projects. The COV further recommends paying more attention to the research on assessment across projects to pursue cumulative knowledge about the development of high quality assessments. The MSP projects represent tremendous research opportunities but these have not been fully explored.</p> <p>The COV does not underestimate the challenge of developing valid and reliable assessments of student learning; however, the partnerships and the evaluation and assessment projects funded to date could prove to be even greater sources of learning.</p> <p>The COV recommends developing both broader and deeper formative evaluations of project progress.</p> <p>Source: Jackets and program information</p>	
<p>2. Does the program portfolio promote the integration of research and education?</p> <p>Comments:</p> <p>While the program portfolio discusses the integration of research and education, not all individual projects reflect strong examples of highly integrated research and education. The NSF might consider funding projects that are designed to address student learning and faculty development and connect with the MSP projects.</p> <p>Of the randomly selected jackets provided to the COV, five were from the RETA program. These include both the construction of resources for the community to share information and the implementation of longitudinal research on the impact as well as the development of assessment tools to measure both the knowledge of teachers and students. Given the state of current knowledge about science learning, this emphasis seems appropriate.</p>	<p>APPROPRIATE</p>

<p>As this knowledge continues to change, it is necessary to maintain flexibility and to pay attention to the developments of basic research in assessment and evaluation.</p> <p>Some of the reviews criticized the proposals because of the lack of “scientifically-based” research designs inclusive of experimental groups. It is important to not exclude from contention proposed projects for funding due to criticism of research designs that lack experimental and control groups of students. “Scientifically-based” research designs tend to focus on student achievement as defined by NCLB for accountability purposes which results in an inappropriate “narrowing” of the curriculum.</p> <p>Source: Jackets and program information</p>	
<p>3. Are awards appropriate in size and duration for the scope of the projects?</p> <p>Comments:</p> <p>The awards vary in size and duration depending on the type of project. Overall, the size of the awards appears appropriate. Without examining a large number of awards, it is difficult to assess the appropriateness of the size of individual awards. The COV had difficulty determining what metric (or set of metrics) is most important – the numbers of students impacted or the number of faculty attending institutes. Or, is a richer measure of student or faculty outcomes the more relevant?</p> <p>The duration appears to be appropriate but depends on outcomes. A question is whether the duration of funding thus far is adequate to achieve sustainability or to demonstrate transformative change. One approach by the NSF could be to select certain projects for enhanced funding and an extended project period in order to determine if the project outcomes are transformative.</p> <p>Source: Jackets and EIS-Web COV module has a “Report View” that provides the average award size and duration for any set of programs or program solicitations you specify.</p>	<p>APPROPRIATE</p>
<p>4. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Innovative/potentially transformative projects? <p>Comments:</p> <p>Various programs are innovative and potentially transformative projects. ATLAST and MOSART represent projects that focus on gaining insight into teachers’ content knowledge and understanding common misconceptions in science. MSPnet is a possible information resource.</p> <p>Source: Jackets and program information.</p>	<p>APPROPRIATE</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 portfolio is diverse, large in scope, and balanced with Targeted, Comprehensive, Teacher Institutes, and several are in the category of Other. There are more projects with a focus on mathematics than science. Several have a focus on traditional teacher professional development and teacher support, and a few on assessment, course development and web-based project and teacher support.</p> <p>The COV encourages the funding of more science projects.</p> <p>Source: Jackets, program information, and some people use as a proxy data on jointly funded projects. See EIS-Web COV module, "Report Review" and select "co-funding from" and "co-funding contributed to" to find jointly supported awards.</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>Lead partners include IHEs, Museums, Corporations/Foundations, Non-Profit, K-12 School Systems, and Professional Organizations. Only one K-12 system is in this portfolio. Award size ranges from \$223,000 to \$7.9 million.</p> <p>Source: Jackets, program information, and EIS-Web COV module for information on award size.</p>	<p>APPROPRIATE</p>
<p>7. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Awards to new investigators? <p>NOTE: A new investigator is an investigator who has not been a PI on a previously funded NSF grant.</p> <p>Comments:</p> <p>Only five of the 31 funded programs are led by new PIs. Providing similar statistics for "unfunded" programs as a comparison would be helpful. Identifying new institutions would also be important for comparative purposes.</p> <p>Of the 17 MSP and RETA awards, five were made to new investigators representing 30% of the total awards.</p> <p>Source: EIS-Web COV module on "Funding Rate," filtered by PI Characteristic (use the pop-up filter).</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>Fifty-two partnership projects reside in 31 different states. Several of the projects cluster in Maryland, Pennsylvania and Massachusetts. Data were not available on the geographic distribution of the applications to examine whether all states submitted proposals. Judging whether the geographical distribution is appropriate is difficult without knowing whether there is an expectation of representation as a function of population density, the distribution of urban areas or a reflection of responses to the challenges of networks in rural areas.</p> <p>Source: EIS-Web COV module, using "Proposals by State"</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 website identifies program awards by type of organization. However, the information actually displays categories by institute of higher education, for profit, not for-profit, or K-12 school system, etc. Within IHEs, the information is not broken out, although an overview of the program shows inclusion of community colleges. When viewing a listing of program awards by type of organization and with IHEs broken out by degree-granting level, the institutions receiving awards are predominantly doctoral-granting universities. Of the 2002-07 awards, 49 went to doctoral institutions, compared with eight to M.S. institutions and two to baccalaureate institutions. None went to community colleges. The institution receiving the award does not fully describe all of the relevant partners, which may include other institutional types. A concern is whether the awards are to institutions that are preparing large numbers of teachers and on whom they rely for professional development and master's degrees. Without systematic review of all NSF awards, it is difficult to assess the extent of involvement of institutional types in the total work being done by the MSP program due to limited availability or accessibility of information. We encourage the NSF to provide a summary or full description of the involvement of all IHEs in the various partnerships.</p> <p>Source : EIS-Web COV module, using " Proposals by Institution Type"</p>	<p>APPROPRIATE</p>

<p>10. Does the program portfolio have an appropriate balance:</p> <ul style="list-style-type: none"> • Across disciplines and sub disciplines of the activity? <p>Comments:</p> <p>A range of science disciplines is the focus of the awards from astronomy, biological science, genetics and chemistry. It is very difficult to see if there is a focus on physics at either the elementary or secondary level. The technology and engineering components of the MSP program that emphasize STEM and STEM education are neither treated as prominent or major components. While not inclusive of all the disciplines or sub disciplines in science, the disciplines represented are appropriate given the various needs teachers and variation of curricular needs across the states.</p> <p>Source: Jackets and program information</p>	<p>APPROPRIATE</p>
<p>11. Does the program portfolio have appropriate participation of underrepresented groups?</p> <p>Comments:</p> <p>Of program awards, only five projects involved Historically Black Colleges and Universities, seven involved Hispanic-serving institutions, two involved tribal colleges and five were at minority post secondary institutions. In only a few cases is the minority institution the lead for the project.</p> <p>Over 700 K-12 school districts are partners in the MSP grants. Summary documents on the COV website do not describe the participation of underrepresented groups in the student or teacher populations.</p> <p>It is difficult to answer the question of whether “appropriate” participation has been achieved without having explicit goals identified for the numbers or percentages of underrepresented groups in the projects.</p> <p>Peer review panelists tried to weigh the merits of the proposal and consider whether the proposals would have an impact on the underrepresented groups or high-need schools but had difficulty in judging both criteria.</p> <p>Source: EIS-Web COV module, using “Funding Rate” with the pop-up filter (this allows you to see female and minority involvement, where involvement means being PI or co-PI).</p>	<p>DATA NOT AVAILABLE</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 program is synergistic with a number of relevant national and related</p>	<p>APPROPRIATE</p>

agency priorities. The program plays a critical role in addressing one of the NSF's strategic goals to integrate research and education. The program aligns well with at least two major pieces of federal legislation - No Child Left Behind (2001) and the America Competes Act 2007.

The MSP program is highly relevant to national priorities for improving the quality of math and science education. It is an ambitious project that is clearly consistent with recommendations in the NRC report *Rising Above the Gathering Storm (2007)* and *Foundations for Success: Report of the National Mathematics Advisory Panel (2008)*. Those recommendations create a direct tie between teacher training and student impact. The importance of the project can be demonstrated only with data on outcomes. It is insufficient to describe the numbers of projects, the numbers of teachers, students and school districts involved, etc. Demonstrating the impact of the MSP program requires careful attention to a conception of what is meant by outcomes: (e.g., student performance, teacher performance, the behavior of arts and sciences and education faculty and the actual interactions of all of the project participants).

The MSP program is consistent with the agency's mission; however, the program description differs in depth from many other NSF programs. The COV suggests calling attention to strengths and results of the MSP program. For example, what has the NSF learned about the structure of successful partnerships? Is a project clearly identified to address this topic? What results have been transformative and for whom?

The NSF would benefit from developing a list of the key questions addressed through the MSP program and a description of the methodology used to address each question. While each individual project has goals and anticipated outcomes, the NSF cannot evaluate the effectiveness of the project as a whole from general highlights emanating from the individual projects. For example, if the NSF takes an interest in the level of interaction among individuals in the partnerships, why not require information on the topic in annual reports and project completion reports? The key questions will drive reporting to the NSF, allowing the NSF to obtain answers to its questions in addition to researching results that develop from the individual projects. These requirements will be most helpful in developing an integrated summary of accomplishments of the MSP program consistent with its goals embedded in the program solicitations.

Source: Program information

13. Additional comments on the quality of the projects or the balance of the portfolio:

One concern expressed by the last COV is the connection between IHE Education schools, school systems and IHE scientists. The inclusion of scientists and mathematicians is an explicit goal of the program. A concern is that scientists and mathematicians may initially agree to participate and later lose connection with the projects. The third year report from the Westat project provided to the COV as a link in COV document 2.4 indicates that many projects continue to maintain good connections to their STEM IHE faculty. The COV encourages the NSF to continue to monitor this participation of scientists, engineers, and mathematicians and to develop an understanding of how to do this most effectively.

Develop stronger ties with REESE and the other directorate programs.

The actual number of proposals submitted, a total of 118, demonstrates a high level of interest in this program; however, only three were awarded in the last call for proposals.

No change occurred in the HBCU leadership area.

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

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

1. Management of the program.

Comments:

Although Section 4.1 of the COV website states this is a program management plan, the “plan” is simply an overview of the FY 2006 program solicitation. It is a description of the solicitation and its areas of focus. Management of the identified accomplishments for the solicitation is not clear, nor is the manner in which program management accomplishes what the solicitation identifies. The 2006 document does not show either the staffing level or its coordination. A separate document from 2003 describes the level of staffing in which seven program staff were assigned full-time to the MSP program. It schematically described a MSP coordinating committee and NSF-wide supporting team. Now that the MSP program falls within EHR/DUE, it is time to clarify and describe the management structure. In 2003, program directors were in various EHR divisions. Are all program directors now within DUE? How is MSP coordinated with other EHR divisions and NSF directorates? Who is responsible for interactions with professional societies?

An NSF press release suggests improvements in student achievement as a result of faculty development associated with the teacher institutes. It is unclear what questions the NSF and its evaluators posed or the extent to which data was available to address the questions.

Some issues require closer attention. For example, the January 24, 2007 press release includes data from 123 schools; however, there are more than 700 K-12 school districts as partners in the program. How does management assess data across all of the project sites? How was the sample of schools decided? What is the schedule for the analysis of data from the most recent years, and is there an anticipated schedule for the release of summary reports and documents on the MSP program? How will the NSF decide to continue funding existing projects should additional funds be made available? What is the mix of new projects and projects being extended?

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

Comments:

The NSF has tried to respond to the needs required by a program like that of the MSP program. RETA seems to be a good strategy to tap critical aspects of the MSP program. One question is whether the timing of RETAS’ products will allow learning from the first MSPs that have ended or are about to end. Based on the sample of projects, two issues are important to consider in the solicitation: (1) Most of the

projects in RETA focus on developing tools to evaluate teachers' knowledge. None of the projects focus on other critical components of the MSPs (e.g., measuring the factors that contribute to the success (or failure) of the interventions implemented at the MSPs). Without this information it is difficult to learn what makes an intervention successful or what factors can be considered for scaling up. (2) Topics tapped by RETA projects should consider the content tapped by MSPs so the tools can be used by many, rather than few, MSPs. The COV recommends making sure that instruments developed by other projects (e.g., RETAS projects) tap what needs measuring, show alignment to the needs and characteristics of MSPs and provide information needed not only by the MSPs but also by the NSF. The NSF must take care that all the awarded RETA projects align with the MSPs' needs and interests and form a coherent set of projects tapping relevant and critical information. The teacher institutes provide contemporary models of university partnerships, teachers as intellectual leaders and accomplished practitioners, (e.g., The Park City model (0314808)).

The Committee praised the external evaluation of the MSPs; however, the COV pointed out some issues that the NSF should consider in relation to these studies. A lack of evaluation information exists that can help improve this NSF program in a systemic way. Are any MSPs considered successful? If so, which ones? What knowledge exists about these MSPs? What makes them successful? What makes other MSPs less successful? Issues about contextual factors (i.e., resources, organization of resources and social processes) within the projects are basically unknown. What are the factors that seem to moderate or mediate the impact of the MSP? If this type of information goes uncollected over time and across the MSPs in a systematic way, the NSF will miss a great deal of learning that would otherwise help improve the MSP program and contribute to the body of knowledge in the field of mathematics and science education.

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

Comments:

The MSP program is a complex but relevant one, and its management reflects dedication and hard work. Still the COV suggests that the NSF reconsider some characteristics of the program planning and the prioritization process in the implementation of the MSP program. For example, it would be more appropriate to require MSPs be implemented in stages, giving an opportunity to each MSP to learn from their own experience and from formative evaluation before full implementation. Early stages should allow MSPs to tune their intervention in a way that it can be more formally tested at later stages.

The COV recommends (1) developing an approach/model that can be adapted and implemented by each MSP, and (2) focusing on critical issues of the programs and providing specific information to facilitate additional learning about what makes an MSP more or less successful.

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

Comments:

In the 2005 COV report, one question dealt with the way that reviewers and proposers applied merit review criteria. It appears that the NSF has tried to and continues to try to improve the application of the review criteria. Some confusion still exists as evidenced by the inequality of the reviews. Likely this remains an issue to be continually addressed.

A question from the 2005 COV report asked, “Did EHR continue to develop its own concepts of the merit review criteria, continue to educate the field about the nature and meaning of the criteria and disseminate a broad view of merit review criteria to prospective applicants and panelists?” The RFP and the NSF website cover this criteria. The EHR appears to continue to address this issue, and we recommend that you continue to address how the MSP proposals deal with intellectual merit.

A 2005 COV question was, “Did the broadening of participation of underrepresented groups continue to be neglected?”

The reviewer base seems to lack diverse participation although this could be a result of incomplete self-reporting data. The 2005 report noted a decline in the underrepresented groups. This trend stabilized based on the reports presented to the 2008 COV, but it is unclear whether it came close to the level reported in 2002.

A self-reporting issue possibly exists regarding reviewers with disabilities as there is little evidence that this group has been a part of the process.

Apparently having HBCUS and minority-serving institutions as lead institutions generates little improvement. Some institutions listed in the latter category may only minimally fill that role.

5. Additional comments on program management:

The MSP program is very large and complex yet there exists potential to learn a great deal about the nature of effective partnerships. Without a structured description of how the program is being managed and implemented, it is difficult to determine whether the MSP program will achieve its full potential. Of the greatest concern is the development of key questions that guide the overall program evaluation and the communication of its results. The individual projects can yield results. Without a clear sense of how the results will be collectively evaluated, the NSF could end up with many results but no integration or comprehensive analysis. The NSF does not benefit from waiting for the results to generate questions. If the NSF is proactive in identifying questions, project results can then be placed into context. The NSF cannot expect project summaries to contain all of the necessary information unless a set of basic questions have been identified and shared with all of the project teams.

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.

To fulfill this mission, NSF has identified four strategic outcome goals: Discovery, Learning, Research Infrastructure, and Stewardship. The COV should look carefully at and comment on (1) noteworthy achievements based on NSF awards; (2) ways in which funded projects have collectively affected progress toward NSF's mission and strategic outcome goals; 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.

To assist the COV, NSF staff will provide award "highlights" as well as information about the program and its award portfolio as it relates to the three outcome goals of Discovery, Learning, and Research Infrastructure. The COV is not asked to review accomplishments under Stewardship, as that goal is represented by several annual performance goals and measures that are monitored by internal working groups that report to NSF senior management.

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."*

Comments:

The NSF MSP program requires systematic attention to the analysis of knowledge being generated by the individual projects. This attention cannot be exclusive to the level of individual projects but rather at larger scales across projects and the program as a whole. Given the different kinds of projects that have been funded, the list of findings could be summarized by program type. It is difficult at present to have a sense of what insights are being learned and from where they are being learned. For example, the COV would like to understand the impact of the program on science and math faculty at IHE's and K-12 teachers. What are the key elements to consider with respect to these two populations? Has the program produced discoveries about what works in improving student learning outcomes and for whom? What are the questions and assumptions driving the MSP program?

One approach to describing fundamental and transformational educational practice outcomes is to have individual projects propose what they consider to be transformative. Another approach would be for the NSF to identify key project outcomes and share them with the broader community with the question in mind of describing models considered to be transformative. The COV encourages the NSF to consider embarking on this kind of project, which has the potential for maximizing the impact of the project and the vetting of the results within a broader community.

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

Comments:

The MSP program is highly responsive to the outcome goal for learning and aims projects at improving teacher performance and student learning. Located in 31 states across the country, the projects impact diverse populations of students. Most projects involve mathematics, but some of the projects focus on science or science following mathematics. The MSP program clearly attends to the expansion of scientific literacy of all citizens by its emphasis on teachers and students in diverse settings. The program’s attention to improving scientific and quantitative literacy deserves consideration as a model for large-scale, systematic change and improvement in K-12 education. On-going, formative evaluation of the outcomes of the program ensures that it continues to improve and achieves the goals of the program.

To create a world-class, broadly inclusive science and engineering workforce and to expand the scientific literacy of all citizens, it is time for all levels within all areas of STEM disciplines with NSF encouragement, to explore the use of technology to improve learning. Research in mathematics and science education supports the use of technology for teaching. Proposals in the future could ideally include specific calls for the use of the Internet, telephone technology, YouTube, podcasting and specifically spreadsheets because of their usage around the world to see how they could be effectively used for delivery of material and learning concepts. The wise use of this technology can effectively improve scientific literacy of all citizens. These are the most commonly used and accessible pieces of technology in all phases of life.

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

Comments:

The RETA projects are the ones in this program concerned with the creation of research tools and cyberinfrastructure. For example, the ATLAST (0445398, Weiss, Horizon) and MOSART (0412382, Sadler, Harvard) projects cover the creation of new tools for research and evaluation. The MSPNet (0634149, Falk, TERC) project is using the web to create infrastructure for facilitating collaborative research efforts. Considerable yet untapped opportunities exist for the development and deployment of new tools for tracking and exploring what is happening in educational projects using tools currently beginning to appear in network theory, modern web technology (blogs, facebook, secondlife, texting, YouTube), and remote communication). We recommend making sure the program remains sensitive to opportunities in these areas.

The MSP program continues to analyze student data from across projects. Results showed significant improvements in the percentages of students scoring on state assessments at or above proficiency levels in mathematics. Elementary students in MSP schools performed significantly

better than non-MSP schools. The MSP program also engages in an expansive set of strategies to learn more about what works and what does not work, and for whom and under what circumstances. Program evaluators will study student outcomes even further. The MSP program also develops instruments to assess knowledge gain in math and/or science on an ongoing basis. Examples include:

- a) Assessing Teacher Learning About Science Teaching (ATLAST) is developing instruments to measure change in the knowledge needed by middle school teachers to teach force and motion, plate tectonics and flow of matter and energy. The analysis involves comparison of pre-test scores of teachers which have been adopted by 13 projects.
- b) Misconception Oriented Standards-based Assessment Resource for Teachers (MOSART) has developed science content instruments with a focus on K-12 physical science and earth science. Versions of the assessments are available free via a web site that is now also directly sharing expertise with MSPs funded through the Department of Education (DOE).
- c) Design, Validation and Dissemination of Measures of Content Knowledge for Teaching Mathematics is designing assessment items to measure teachers' content knowledge in mathematics. Tailored for the teaching of mathematics in upper elementary grades (number, operations, pre-algebra, and algebra, and geometry), the items also assess teachers' abilities to analyze and understand student work. The project has been disseminated to approximately 80 projects, including 10 NSF MSPs and numerous DOE MSPs.
- d) Vermont Mathematics Partnership designed pre- and post-tests to track growth in teacher content knowledge of proportional reasoning or "math as a Second Language".
- e) The MSP-net system serves the MSP projects, but it also has an open portal for anyone interested in the type of work supported by the MSP program. The library provides a permanent, comprehensive set of articles related to research and development on partnerships, teacher learning, challenging courses and curriculum as well as evidenced-based design of these activities.

Forty-eight partnerships and more than 30 other tool-development and evaluation projects comprise NSF's current MSP portfolio, representing a total investment of nearly \$600 million to date. NSF MSPs' research and development components complement MSPs at the DOE that disseminate educational tools and strategies to all 50 states via formula funds. After a complete analysis of the data, results from the first-year evaluation were publicly available at the NSF's MSP web site in Spring 2006. MSP data will undergo evaluation for at least three more years.

PART C. OTHER TOPICS

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

As noted earlier in the report, some issues to address include the following:

- a. The reporting of minority involvement at most levels from actual participation in the management of the awards to the students and teachers affected by the awards.
- b. Assignment of panelists to individual proposals because reviewers may not be as balanced as desirable.
- c. The limited amount of formative evaluation research from the six-year history of the awards; evaluative information will come, but so far there is only scant evidence of the formative evaluation research that might inform the projects as they develop.
- d. The lack of an evaluation framework that can guide the evaluation across the projects and that can inform NSF about the MSP program as a whole.
- e. The portfolio contains significantly more mathematics awards than science awards; this could be the result of the submitted awards or the quality, but it is noticeable. NCLB might be a driver in the production of more math proposals while inhibiting science proposals.
- f. Having minority institutions and schools as the lead on the proposals appears to be problematic.
- g. Many awards lack evidence of substantive involvement of content experts.

The MSP program very much interests the COV. Evaluation of individual projects is underway and results are beginning to appear. The COV encourages the MSP program to develop a set of key questions to apply to all projects. These questions provide a framework for a meta-analysis of results across the program as a whole.

With a complex program such as the MSP program involving over 50 different types of projects, not all projects will have the same focus or address the same set of topics. The COV recommends a matrix approach to identifying similarities among projects and perhaps suggesting projects that can be considered together and those that may be contrasted. Develop strategic questions that will fall in a particular hierarchical order. The MSP program might consider hosting a focus group of current PIs and other individuals who could help create the questions to be addressed. The questions then become the framework for the communication of results from the MSP program. Rather than conducting a retrospective analysis, the COV recommends performing analyses while the projects are still underway.

The COV encourages the MSP program to keep an eye on what works and does not work in various settings. What are the lessons? What works, for whom and under what circumstances?

The management plan for the MSP program should provide a clear communication strategy for results undergoing development from the program.

The COV has a significant interest in understanding the kinds and levels of interactions of IHE faculty in education and in arts and sciences, K-12 teachers and students. In what ways is the program documenting the kinds and qualities of the interactions above and beyond the Westat Project?

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.

Comments:

The COV praises the efforts made by the NSF to improve the implementation and impact of the MSP program. The COV recognizes the difficulties involved in monitoring and managing such a large and complex program and recommends exerting greater effort in the design of strategies that can help to tap relevant MSP issues. For example, define critical indicators that focus on outcomes at different distances of the MSP program goals: proximal -- improvement of teacher knowledge and instructional and assessment practices; distal -- improvement of student learning and scientific literacy; remote -- improvement of science and engineering workforce.

A priority recommendation is to develop an approach/model that guides the data collection across MSPs as well as the external evaluation. The model proposed by Yin (2007) does not seem to address, at least in the figure provided (p.30), critical information that can help learn what moderates and/or mediates the effectiveness of MSPs. This complex program needs a model that addresses critical "third variables" and information on critical indicators that can be collected within and across MSPs. The model also should provide clear indicators of the critical MSP components that could guide the diverse methods of review mechanisms (e.g., site visits, reverse site visits). Although the review mechanisms are appropriate, their implementation lacks consistency and should specify what critical information, program components and implementation require the most focus and what can be learned from the MSPs.

Despite the importance of teachers' content knowledge in the classroom, little effort has been made to learn how that resource or others for that matter (e.g., students' characteristics, curriculum characteristics, and other instructional tasks) is useful in the classroom and actually helps to achieve the goals. Little information is available about what students are getting from this program. A greater understanding at the classroom and context level would move the field of mathematics and science education forward. Focusing on the resources, organization of resources and interaction process should lead to a better understanding of the actual impact PDS and other interventions have on the everyday practice.

Teachers' knowledge is only one of the multiple resources to study at the classroom level. Interaction processes should involve teachers and students: how teachers provided opportunities to students to make sense of science and math; how they take advantage of students' backgrounds and characteristics; how they help students engage in their learning and how they create a community of learners in the classroom. MSP projects are a valuable learning source that is being underused.

The development of strong and effective communication skills is necessary in order to create a world-class, inclusive scientific workforce and expand the scientific literacy of all citizens. Development of such skills, while not normally considered a part of the NSF's goals, requires close attention to discourse and communication efforts in the MSP program. It is virtually impossible to cultivate the scientific literacy of all citizens without this attention.

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

Comments:

The NSF Strategic Plan calls for strategic investments that support “transformational research and promote excellence in science and engineering education in ways that will fuel innovation, stimulate the economy and improve quality of life.” The NSF does not provide a definition of transformation or an example of transformation at different levels. The COV struggled to identify projects that were deemed transformative. The COV feels that many projects that have transformational potential happen on the local level. They should be understood well enough to be scaleable.

While improving proficiency in the performance of all students, it is critical that the MSP project monitors, evaluates and learns from its investments so that it addresses the persistent achievement gap among subpopulations.

The goal of the MSP program is to bring STEM faculty and education faculty together with a common goal of improving student learning in math and science. The COV finds the location of the MSP program in the Division of Undergraduate Education appropriate because of its role within the NSF.

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

None noted.

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

On the COV website, cite 7.4 for the MSP Program Evaluation report. Unfortunately, the site lists only one report for the first quarter of 2006. Is there a summary report for each year?

The COV would find it beneficial to receive communication at least two-three weeks prior to the meeting, along with a succinct list of materials to be reviewed including the template. Also consider asking individual COV members to focus on particular aspects in preparation for the meeting. As a result, the members could be better prepared for the conversations and have a better understanding of the program as a whole. In some instances, summary documents provided to describe the program helped as an overall view but did not contribute to further understanding of different kinds of projects that have been funded.

Navigating the support materials should be more user-friendly. Provide a Webinar two-three weeks in advance. Cross link to information of the same kind across projects. Notify the COV of this availability within a minimum of two weeks in advance.

SIGNATURE BLOCK:

For the FY 2008 NSF Committee of Visitor Reviews
Maria Alicia Lopez-Freeman
Chair

MEMORANDUM

DATE: December 31, 2008

TO: Bernice Anderson, Senior Advisor for Evaluation
Directorate for Education and Human Resources

FROM: Joyce Evans, Senior Program Director
Math and Science Partnership Program

SUBJECT: COV for the Math and Science Partnership (MSP) Program
COI and Diversity Memo

The Committee of Visitors report for the Math and Science Partnership Program was approved at the EHR Advisory Committee meeting held at NSF on November 5-6, 2008. The COV consisted of eight 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.

Category of COV Membership	No. of COV Members in Category
Member of EHR Advisory Committee.....	.....
Organization Type:	
<input type="checkbox"/> University.....	.....6....
<input type="checkbox"/> Four-year College.....	.....1....
<input type="checkbox"/> Two-year College.....	.....
<input type="checkbox"/> K-12 School or LEA.....	.....1....
<input type="checkbox"/> Industry.....	.....
<input type="checkbox"/> Federal Agency.....	.....
<input type="checkbox"/> Public/Private Foundation.....	.....
<input type="checkbox"/> Membership Associations.....	.....
Location	
<input type="checkbox"/> East.....	.....3....
<input type="checkbox"/> Midwest/North .....	.....1....
<input type="checkbox"/> West.....	.....2....
<input type="checkbox"/> South.....	.....2....
Gender	
<input type="checkbox"/> Female.....	.....2....
<input type="checkbox"/> Male.....	.....6....
Persons with Disabilities.....	.....
Race/Ethnicity	
<input type="checkbox"/> White.....	.....4....
<input type="checkbox"/> Black.....	.....1....
<input type="checkbox"/> Hispanic.....	.....3....
<input type="checkbox"/> Asian/Pacific Islander.....	.....
<input type="checkbox"/> Native American.....	.....

The COV was briefed on Conflict of Interest issues and each COV member completed a COI form. COV members had no conflicts with any of the proposals or files. (or, if they did, use 'Proposals and files were not available to COV members in those cases where the member had a COI and members were not allowed to participate in discussions of actions with which they had conflicts.')