

**REVISED TIME 4/3/2009 12:12 PM**  
**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](http://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 sub activities as well as NSF-wide activities. The directorate or division may instruct the COV to provide answers addressing a cluster or group of programs – a portfolio of activities integrated as a whole – or to provide answers specific to the sub activities of the program, with the latter requiring more time but providing more detailed information.

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

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.

<b>Date of COV:</b> March 25 – 26, 2009
<b>Program/Cluster/Section:</b> Robert Noyce Teacher Scholarship Program
<b>Division:</b> Division of Undergraduate Education
<b>Directorate:</b> Education and Human Resources
<b>Number of actions reviewed:</b> <b>Awards:</b> 25 <b>Declinations:</b> 25 <b>Other:</b> 3
<b>Total number of actions within Program/Cluster/Division during period under review:</b> <b>Awards:</b> 50 <b>Declinations:</b> 146 <b>Other:</b> 6
<b>Manner in which reviewed actions were selected:</b>  <p>The COV Chair was asked to pick a digit, between '0' and '9', that would be used in selecting the proposals based on the occurrence of the selected digit in the proposal number. She chose the number '3' and proposals were selected through a process of looking at the last digit of the proposal ID number, then the next to last digit until the desired number of proposals had been selected. This process worked well for the declinations and a total of 25 proposals were pulled for the COV to review. Since there were no award jackets that ended in '3', randomly generated numbers were assigned to each of the award jackets, which were then sorted according to those numbers. Once sorted every third proposal was pulled until 25 award jackets were selected.</p> <p>The resultant list comprised 50% of all awards and 17% of all declinations for Noyce during FY 2005, 2006 and 2007. Altogether 25 awards, 25 declinations and all 3 "return without review" proposals were selected for COV review.</p>

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

Briefly discuss and provide comments for *each* relevant aspect of the program's review process and management. Comments should be based on a review of proposal actions (awards, declinations, and withdrawals) that were *completed within the past three fiscal years*. Provide comments for *each* program being reviewed and for those questions that are relevant to the program under review. Quantitative information may be required for some questions. Constructive comments noting areas in need of improvement are encouraged.

**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 <sup>1</sup>
<p>1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?</p> <p>Comments:</p> <p>Panels conducted all reviews which usually allow more discussion and consensus in contrast to individual mailed reviews which do not. The reviews followed the guidance in the program solicitation.</p> <p>Source: Jackets and COV documents.</p>	<p>YES</p>
<p>2. Are both merit review criteria addressed</p> <p>a) In individual reviews? The individual reviews tended to address the “Broader Impacts” criterion more effectively than the “Intellectual Merit” criterion.</p> <p>b) In panel summaries? Panel Summaries addressed the “Broader Impacts” criterion but comments about the “Intellectual Merit” were vague and often reiterated the project goals and objectives.</p>	<p>YES</p>

<sup>1</sup> If “Not Applicable” please explain why in the “Comments” section.

<p>c) In Program Officer review analyses?  The program officer analysis did not elaborate on the two merit review criteria beyond stating that they were considered in making a decision. The COV feels that clarification would allow more substantive statements in the reviews and program officer correspondence regarding use of the broader impacts and intellectual merit criteria in the merit review.</p> <p>Comments:</p> <p>The first merit criterion was difficult to evaluate. While there were some proposals that were based more on research findings than others, it is difficult to evaluate the intellectual merit and creativity of some of the proposals.</p> <p>Source: Jackets</p>	
---	--

<p>3. Do the individual reviewers provide substantive comments to explain their assessment of the proposals?</p> <p>Comments:</p> <p>In general, comments were more substantive for above average to excellent proposals, but not as substantive for good to poor proposals. Across all years we noted that several individual reviewers provided little substance in their very short reviews.</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>The panel comments synthesized the comments from individual reviewers. We saw little evidence of a lack of consensus.</p> <p>Source: Jackets</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>Comments:</p> <p>For funded proposals, the decision documentation highlights the merits of the programs. Declined proposals contained a boiler-plate statement with no comments unique to the declined proposal.</p> <p>Source: Jackets</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>Documentation included panel summaries and the context statements. For declined proposals, the rationale was not specific to the particular proposal, but generic to the Noyce Program.</p> <p>Source: Jackets</p>	<p>YES</p>
<p>7. Is the time to decision appropriate?</p> <p>Note: Time to Decision --NSF Annual Performance Goal: <b>For 70 percent of proposals, inform applicants about funding decisions within six months of proposal receipt or deadline or target date, whichever is later.</b> 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>YES</p>

<p>Comments:</p> <p>Yes, most appropriate</p> <p>100% of the proposals in 2005-07 were processed within six months with an average dwell time between 130 and 150 days over the three years considered.</p> <p>Source: Jackets and COV documents (e.g., Dwell Time (Time to Decision))</p>	
--	--

<p>8. Additional comments on the quality and effectiveness of the program's use of merit review process:</p> <p>In general, implementation of the review process for 2005-07 occurred in an effective and timely manner. Further information on what is meant by "intellectual merit" would enhance this program. Neither panelists nor program officers tend to address it in a substantive way. Such information would allow more substantive statements in the reviews and program officer correspondence to explain the use of the broader impacts and intellectual merit criteria in the merit review. The COV expressed concern about the meager substance in many reviews.</p> <p>Source: Jackets</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.

<b>SELECTION OF REVIEWERS</b>	<b>YES , NO, DATA NOT AVAILABLE, or NOT APPLICABLE<sup>2</sup></b>
<p>1. Did the program make use of reviewers having appropriate expertise and/or qualifications?</p> <p>Comments:</p> <p>In general, the COV found that program reviewers represented various constituencies and areas of expertise and seemed well qualified to carry out their tasks.</p> <p>Source: Jackets and COV documents (e.g., Lists of Reviewers, Reviewer Demographic Information)</p>	<p>YES</p>

<sup>2</sup> If "Not Applicable" please explain why in the "Comments" section.

<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>As listed in sections 3.1 and 3.2 of the COV notebook, reviewers were quite balanced in most respects. Analysis of reviewers showed a good gender balance, good representation of minorities and good representation from community colleges. The disciplinary balance seemed appropriate, but could have included more mathematicians. The representation from master's degree universities that prepare many teachers was lower than expected; in contrast, Ph.D.-granting institutions had substantial representation.</p> <p>The reviewers represented various types of institutions from areas around the country and included appropriate percentages of both majority and minority groups. The COV noted that a higher percentage of reviewers from school districts, at least one per panel, could provide broader understanding among the panels of the needs of school districts. Business and industry as well as higher education appear well represented with strong school ties.</p> <p>Source: Jackets and COV documents (e.g., Lists of Reviewers, Reviewer Demographic Information)</p>	<p>YES</p>
<p>3. Did the program recognize and resolve conflicts of interest when appropriate?</p> <p>Comments:</p> <p>It is difficult for COV members to identify many conflicts of interest, but those that were apparent to us (e.g., same institution) were rare. When they occurred, those individuals with a conflict recused themselves from rating and discussing a proposal.</p> <p>Source: Jackets</p>	<p>YES</p>

4. Additional comments on reviewer selection:

Because schools and school districts are the ultimate beneficiaries of these new teachers, we recommend the review of each proposal by a representative from K-12 schools. Similarly, including representatives from community colleges would enhance each panel.

**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.

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE <sup>3</sup> , OR DATA NOT AVAILABLE
<p>1. Overall quality of the research and/or education projects supported by the program.</p> <p>Comments:</p> <p>The quality of the projects meets the goals of the Noyce Program. Prior to awarding projects from the 2005-07 submissions, panels of experts reviewed and judged each proposal based upon the program requirements. As the years progressed, the quality and number of the proposals improved due to the critical reviews and ratings from the review panels. Additionally, the reduced funding rate in 2007 reflects a dramatic increase in the number of proposals submitted.</p> <p>Source: Jackets and COV documents (e.g., Section 4 Award Information)</p>	APPROPRIATE
<p>2. Does the program portfolio promote the integration of research and education?</p> <p>Comments:</p> <p>Although the Noyce Program focuses on teacher education, it evaluates (i.e., studies) all projects as well as the overall program. Further, some projects also partner with separately funded but complementary research projects. The COV believes that much more could be done to integrate research into this educational program.</p> <p>Source: Jackets and COV documents (e.g., Section 4 Award Information and Section 5 Examples of Program Accomplishment)</p>	NOT APPLICABLE

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

<p>3. Are awards appropriate in size and duration for the scope of the projects?</p> <p>Comments:</p> <p>Yes, however; we note the direction of most budget allotments is toward funding to support participant scholarships and stipends. (We understand the role of congressional guidance in the budgets.) Project leaders are struggling with the research and evaluation process. While this is not primarily due to funding, we recommend giving consideration to a budget that specifies research and evaluation requirements and funding that supports the specifications. If this is not possible within the Noyce Program constraints, we recommend partnering with other NSF directorates to achieve better integration of research and evaluation into Noyce projects.</p> <p>The Noyce Scholarship Program to date has clearly demonstrated the need for teacher development in the STEM areas, and those projects that have received awards are in most cases effectively implementing programs that are successful. To sustain momentum, we suggest providing renewals to successful programs and enhancing the effectiveness of both internal and external research and evaluation. We further recommend extending Noyce awards to a broader array of institutions including those in areas of the country that are not currently receiving Noyce awards.</p> <p>Source: Jackets and COV documents (e.g., Section 4 Award Information)</p>	<p>APPROPRIATE</p>
<p>4. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> <li>• Innovative/potentially transformative projects?</li> </ul> <p>Comments:</p> <p>The program portfolio certainly includes some innovative, potentially transformative projects. It includes a number of collaborative efforts, where the Noyce project has designed its efforts in collaboration with effective NSF funded projects and has therefore enhanced the institution's ability to increase the number of highly effective STEM educators in high needs schools. Other projects are pursuing and meeting the goals of the projects, yet transformation and innovation may not be at the forefront of their efforts. Noyce may benefit from providing the opportunity for sharing among projects (which we were pleased to see is now being funded), so that innovation and transformative strategies may be replicated across the spectrum of projects. We encourage consideration of a project that would provide a summary analysis of the results from a range of innovative strategies.</p> <p>Collaboration between education and science/math content departments is critical to developing a team of higher education faculty who believes that K-12 teaching is an important career endeavor.</p> <p>Source: Jackets and COV documents (e.g., Section 4 Award Information)</p>	<p>Appropriate</p>

<p>5. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> <li>• Inter- and Multi- disciplinary projects?</li> </ul> <p>Comments:</p> <p>The Noyce program as a whole is inherently interdisciplinary; STEM faculty from the mathematics and science departments and from the departments of education must collaborate with K-12 teachers from the partner districts in order to ensure that a project is successful. Many of the projects are appropriately highly focused but still have close interaction between scientists/mathematicians and educators.</p> <p>Source: Jackets and COV documents (e.g., Section 4 Award Information and Section 5 Examples of Program Accomplishment)</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>None noted.</p> <p>Source: Jackets and COV documents (e.g., Section 4 Award Information)</p>	<p>NOT APPLICABLE</p>
<p>7. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> <li>• Awards to new investigators?</li> </ul> <p>NOTE: A new investigator is an investigator who has not been a PI on a previously funded NSF grant.</p> <p>Comments:</p> <p>In review of projects awarded in 2005-07 twenty (20) of forty-nine (49) awards were to new investigators. This percentage was appropriately high and reflects an attempt to provide opportunities for leadership from “new” proposers. We suggest reviewing ongoing results of implementation and results from these investigators to determine if innovative, transformative projects are resulting from their efforts.</p> <p>Source: Jackets and COV documents (e.g., List of New Project / Renewal Awards)</p>	<p>APPROPRIATE</p>

<p>8. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> <li>• Geographical distribution of Principal Investigators?</li> </ul> <p>Comments:</p> <p>The previous COV stated “There needs to be better representation in the northwestern, upper Midwest and Rocky Mountain states.” The situation has improved as follows: four new awards in the Northwest, one new award in the upper Midwest and one new award in the Rocky Mountain states. However, the program portfolio still needs better geographic distribution.</p> <p>With the exception of California, very few awards go to the west region of the country, an area especially important for serving Native American students; the eastern part of the country also shows states with no awards.</p> <p>The comments in this section cover the review of 2005-07 awards. In reviewing awards made in 2008-09 we note expanded geographic coverage.</p> <p>Source: Jackets and COV documents (e.g., Awards Distribution Information – Geographic Map)</p>	
<p>9. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> <li>• Institutional types?</li> </ul> <p>Comments:</p> <p>The majority of institutions receiving Noyce grants were doctoral-granting universities. The COV suggests that more baccalaureate and masters institutions receive support because they are more extensively involved with teacher preparation and often are better able to recruit underrepresented groups into STEM teaching.</p> <p>Noyce awards totaled 49 during the 2005-07 time frame. Most of the awards (34 awards or 69%) were to doctoral institutions, with only 12 to masters-granting and 5 to baccalaureate-granting institutions. The COV urges the NSF staff to find ways to increase the number of proposals and awards to masters and baccalaureate institutions.</p> <p>Source : Jackets and COV documents (e.g. Awards Made FY 2005-2007)</p>	<p>APPROPRIATE</p>
<p>10. Does the program portfolio have an appropriate balance:</p> <ul style="list-style-type: none"> <li>• Across disciplines and sub disciplines of the activity?</li> </ul> <p>Comments:</p> <p>The breakdown of the recipients by discipline is Biology (22%), Mathematics (37%) and Physical Sciences (22%). Chemistry represents 8% of the Noyce</p>	<p>APPROPRIATE</p>

<p>recipients and Physics/Physical Sciences has 6%. Some of the projects involved attention to mathematics and an area in the sciences.</p> <p>Source: Jackets and COV documents (e.g., Section 4 Award Information)</p>	
<p>11. Does the program portfolio have appropriate participation of underrepresented groups?</p> <p>Comments:</p> <p>The demographic data shows that roughly 60% of the Noyce recipients are white, while 15% are Latino/Hispanic, 11% Black/African American and almost no representation from American Indian, Alaska Native, Native Hawaiian or Other Pacific Islander groups. The trends for inclusion of underrepresented groups are encouraging but the schools of the future need a more diverse pool of teachers who have backgrounds similar to their students.</p> <p>Source: Jackets and COV documents (e.g., Section 4 Award Information and Section 6 Program Monitoring and Evaluation – Student Demographics)</p>	<p>APPROPRIATE</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 Noyce scholarship program addresses critical national needs. Many proposals reference the need to prepare highly qualified teachers of STEM disciplines as defined by <i>No Child Left Behind</i>. In addition, the funded projects are making good headway toward increasing underrepresented groups in the teaching pool. The number of applicants increased dramatically from 52 in 2005 to 91 in 2007, suggesting the effectiveness of communication about the opportunities of the Noyce Program. Overall, it is clear that the Noyce program responds to reports such as “Rising Above the Gathering Storm”.</p> <p>Source: Jackets and COV documents (e.g., Section 4 Award Information and Section 5 Examples of Program Accomplishments)</p>	<p>APPROPRIATE</p>
<p>13. Additional comments on the quality of the projects or the balance of the portfolio:</p> <p>The COV felt that the quality of the awards is appropriately high.</p>	

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

1. Management of the program.

Comments:

We reviewed a range of materials in evaluating the management of the Noyce Scholarship program. First, we examined the e-jackets (and some hard copy materials) for a large number of funded and declined proposals. The information was well organized and complete. It was possible to review the history of actions for any proposal. Information was consistent among the panel reviews, panel summaries and decision notifications.

Summary information included in the COV notebook was comprehensive, complete and well organized. Along with the e-jacket information, the notebook represents an organized program that responds in a very timely way to proposal submissions. The speed at which decisions are made within the program is remarkable and the program officers deserve commendation. The program has attempted to have review panelists that are diverse in terms of background, gender, ethnicity and institutional type. For the most part, the balance is quite good, although the COV noted the high percentage of reviewers from doctoral institutions and low percentage from masters, bachelors and associates granting institutions, and suggest that panels could include more mathematicians.

Communications with the PIs are very complete. Detailed instructions went out to PIs during the pre-award phase that covered changes to budgets, making suggestions for revisions or asking for greater clarity. The process of managing awards seems to go smoothly.

PIs and program officers attended meetings. Comments contained in various communications suggest that investigators and any students who attended benefited from the activity.

The program appears to be very well run and efficiently managed. Results are monitored, and a survey is in place that is part of an annual reporting system.

Evaluation of the program is in relatively early stages. The COV is interested in learning much more about the evaluation of individual programs and the program as a whole. We recognize that the Lawrenz, et al. report of February 2009 is a work in progress. Especially given the potential for expansion of the program, we encourage the NSF to move the process of evaluation along so that summary results can be shared over the next several months. We are interested not only in the impact on numbers and quality of teachers, but also on learning by students. Continuation in the profession of teaching is of great interest and requires various longitudinal analyses.

The program may have a wide range of outcomes, some anticipated and others not. What are the basic program outcomes that are of most interest? Is it possible to prepare an evaluation document that speaks to a defined set of program goals, and then give examples of progress towards goals at individual sites? The current evaluation can describe characteristics of participants in many respects, but it would be informative to see analyses specifically related to program and site goals.

In addition to meeting goals of the program, the projects took varying approaches and the experiences of the Noyce Scholars were different as a result. What experiences proved most valuable? In addition to a more global analysis of characteristics of scholars or their experiences, we wish to know what was learned about scholars (e.g. teaching practices, persistence in teaching) and K-12 student learning outcomes.

The COV is interested in seeing a summary of outcomes of the program that could identify strategies that work best and highlight especially innovative programs that might serve as a model for others. For example, the Rochester Institute of Technology has collaborated with CSU – San Marcos. While separated widely, the institutions are collaborating effectively and have proven they can recruit students.

Source: COV documents (e.g., Section 2 Materials for FY 2005-2007 Supporting the Integrity and Efficiency of Management)

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

Comments:

The nature of the program, with its emphasis on providing scholarships and stipends for students to become certified teachers in STEM disciplines, results in a somewhat formulaic approach to the preparation of proposals by investigators. It is difficult to evaluate the responsiveness of the program to emerging research and educational opportunities. However, we note the modifications in the program over time as evidenced by more recent program solicitations, and the attention of the program to both NSF review criteria, as indications that the program is trying to be responsive to new opportunities and results from research. In addition, the program could achieve broader impact by also creating expectations for more rigorously educated and STEM-engaged K-12 student populations.

Source: COV documents (e.g., Section 6 Program Monitoring and Evaluation and Section 7 Publications and Dissemination Efforts)

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

Comments:

The Noyce Scholar program differs from others in having its origins in Congress and with specific language pertaining to the program in the NSF Authorization Act of 2002 and the America COMPETES Act of 2007. The NSF program is directly responsive to this legislation. The proposal recommendation process suggests careful consideration of the critical elements in a successful proposal in alignment with goals of the program. Program planning and prioritization has led to the development of program solicitations, which have been modified and strengthened over time.

Source: COV documents (e.g., Section 2 Materials for FY 2005-2007 Supporting the Integrity and Efficiency of Management and Section 3 Materials for FY 2005-2007 Supporting the Integrity and Efficiency of Process)

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

Comments:

The NSF staff for the Noyce Program has provided comprehensive responses to the prior COV, including updates. The prior COV was the first one for this new program. Some of the responses

provided factual information not known to the COV or perhaps was misconstrued. Many responses acknowledged the validity of the concerns or suggestions and made clear the intent to respond, with evidence of implementation in the updates or occasionally by the time of the initial staff response. In our view, the staff response to the prior COV was excellent.

Source: COV documents (e.g., Previous COV Report, Response and Update and Section 4 Award Information)

5. Additional comments on program management:

Comments:

Very impressive work by the NSF staff under especially difficult conditions thus far.

## 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:

As the focus of the Noyce Program is STEM Teacher Education, research is not a major priority. Nonetheless, some new knowledge will emerge from this program through the evaluation research from individual projects and the overall program evaluation.

Program evaluation descriptions contained in the proposals we reviewed are limited in scope. Most appeared to be hindered by the requirement that only 15% of funds be used for management and evaluation. Moreover, research opportunities pursued among the proposals reviewed were far too infrequent. While the category of Monitoring and Evaluation proposals under the new Noyce II RFP appears to have potential, there have been far too few funded proposals in this category.

We note one good example of research and evaluation in proposal #0630417 (PI: Patrick Thompson, Arizona State University.) This proposal, like others, focused on high needs populations but also included creative ideas for research and evaluation. Further, the Noyce grant is complementary to research being done by the same investigator. This would be a project to follow

carefully.

Another example of strong evaluation is proposal #0733788 (PI: Kathleen Marrs, Indiana University.) They plan to follow the teachers completing certification in June 2007, using an established Alumni Survey to aid data collection. Student data on achievement will be used to judge teacher effectiveness. This proposal also focuses on high risk students, includes strong minority recruitment strategies, and has established a strong partnership with Indianapolis Public Schools. It was based on a prior program in which the Science Education Department at the University partnered with surrounding urban schools. This proposal addresses a number of the practices the COV regards as exemplary.

**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 Noyce Program focuses directly on producing a “world-class, broadly inclusive science and engineering workforce” through its focus on teacher education. Because teachers reach many students and possibly their parents and others, this program has the potential to also expand scientific literacy. The COV believes that most of the awards we reviewed are likely to contribute to this goal.

The Noyce portfolio provides a highly needed stimulus to the recruitment and education of STEM teaching professionals. Taken as a whole, the funded projects are increasing the output of highly qualified STEM teachers, which will ultimately result in a program with better education for the “science and engineering workforce.” In addition, the emphasis on recruiting Noyce participants from various under-represented groups will expand the diversity of the teaching workforce, and will hopefully lead to a more highly diverse set of role models to promote the goal of greater inclusion in the STEM disciplines.

One example of creative ideas for learning was proposal #0630417 (PI: Robert Olsen, Washington State University). This program recruits engineers to become mathematics teachers; additionally, it provides summer positions for the Noyce Scholars in engineering firms to continue their learning about mathematics in engineering.

**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:

Not applicable

## **PART C. OTHER TOPICS**

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

Overall this is an exemplary program.

#### **Program Evaluation**

Program evaluation data seems to be limited. Among proposals reviewed in the COV process, evaluation plans seem relatively modest, most likely because of the limited proportion (15% cap now raised to 20%) of Noyce funds that can be directed toward “non-scholarship/stipend” activities. It is difficult to mount an adequate evaluation with this small resource. Moreover, the program evaluation recently completed at the University of Minnesota focuses heavily on surveys with the support of some interview data. If the NSF Noyce program hopes to obtain data to increase program effectiveness to increase and improve the nation’s population of STEM teachers, with positive impacts on student achievement, the overall program evaluation design must be much more extensive. For example, while looking at student achievement data would be difficult, it is not impossible. The COV believes that student achievement data represent an opportunity that should be pursued. Additionally, triangulated assessments of teacher effectiveness would be important to obtain. And some thought should be given to how to reach the numbers of STEM teachers required.

The Noyce II grants offer a new opportunity to evaluate and perform research on these important projects. We hope that the NSF promotes the submission of many creative proposals in this category. In addition, we recommend that a more broadly conceived program evaluation be undertaken through an outside evaluation agency to try to capture program outcomes including resulting student achievement.

#### **Partnerships**

The COV encourages partnerships with community colleges. Although the Noyce program was not widely utilized by community colleges during the years of our review, there is a need for lower division scholarships to encourage and support talented math and science students, often from underrepresented groups who enter at the community college level. We encourage strong representation from community college faculty and administrators on review panels to represent the large number of two-year college students who are good candidates for STEM K-12 teachers.

Partnerships between K-12 schools and higher education institutions should be strengthened. The evaluation completed by the University of Minnesota in 2009 notes that among the funded projects, higher education institutions collaborated with K-12 schools primarily by using them as practicum sites; conversely K-12 schools collaborate with higher education by hiring their graduates. Both practices represent a very superficial approach to working together. While it is true that some proposals cite intentions to work closely with school districts, more often the stated collaboration appears to be that the schools would provide induction support. What would be more useful is truly working together on the education of future teachers.

We suggest promoting partnerships with professional organizations to connect new teachers to scientific societies (e.g., ACS, OBFS, and AIBS) as well as to professional teaching organizations (NSTA, and NCTM). An important factor for teacher retention is that new teachers feel connected to the profession. New teachers can benefit greatly from scientific

societies and from professional teaching organizations. The professional organizations would also gain from larger pools of talented new members.

One way to improve the identified “collaboration gap” would be for the Noyce RFP to mention more explicitly that collaborations of the types mentioned above will be considered an important criterion. In addition, we recommend taking steps to better fund the collaborative activities (again the 15-20% cap issue) and to increase the funding for activities beyond scholarships and stipends.

**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.**

How is the impact across Noyce grantees documented and how do Noyce programs learn from each other? The PI meetings initiated by the NSF staff (through the grant to AAAS) represent an excellent first step. An unexplored opportunity is to take advantage of emerging social networking models. In particular, emerging web-based citizen science programs may provide an interesting model (e.g., USGS seismometer website; Project Budburst website). The research link in this case might be scientific teaching. The COV imagines such a research network could provide opportunities for sharing data, ideas that work, problem solving, as well as a data platform for education researchers. We note a recently funded project at the AAAS and a developing website that could be effective in the dissemination of successful practices.

Another mode for sustainability could be initiated to engage the students in effective science/math teaching practices. Social networking platforms permit sharing of questions encountered in the practice of teaching as well as best personal practices to address challenging situations. These modalities could be open websites or websites hosted by recognized master science/math teachers to more effectively assure accuracy of scientific information.

What is the plan for dissemination of the best ideas and practices from the Noyce Program? What works where? We see tremendous opportunity in the Noyce Program for adding knowledge about effective practices in teacher education that increase the number and quality of teachers, and improve the achievement and interest in STEM fields among students. We encourage thoughtful consideration of summary materials that could highlight successful practices in recruiting, mentoring, induction and other means that train, support and retain teachers. These materials could be used by NSF personnel in making presentations at scientific meetings and for champions of the Noyce program to have available real stories to tell of the program’s successes.

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

The COV would like to know what the entire portfolio of programs that fund teacher training looks like across EHR and the NSF as a whole. Clearly there are a number of programs in EHR focused on teacher education. How are they linked? Are they synergistic and if so, how? How do they share results and stories? Specifically, are the Math and Science Partnerships (MSP) sharing information on best practices with the Noyce program? Beyond EHR, how is Noyce connected with the science portfolio? With the expectation that science PIs have a broader impacts strand in their grants, there is an opportunity for Noyce to play a role in achieving broader impact. How many grantees are working with Noyce scholars? How many science grantees are funding a Noyce scholar or teacher as part of their broader impacts work? Are

NSF-REU programs involving Noyce scholars? Cultivating these kinds of connections would provide one avenue to enhance sustainability and forge critically important partnerships between Schools of Education and science content departments as well as between new teachers and their scientist colleagues. For example, is the new I<sup>3</sup> Program achieving its integrative goal? Specifically are the Math and Science Partnerships (MSP) sharing information on best practices with the Noyce program? The COV believes the Noyce Program provides tremendous opportunities for the NSF in general, and EHR in particular, to become more integrative and synergistic.

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

The COV would like to see the Noyce scholars program become more visible. One possible activity for the future would be to involve professional societies (e.g. NCTM, NSTA, and AAAS) in recognizing Noyce scholars and Noyce master teachers. Outstanding Noyce scholars could be invited to present at the annual Noyce PI conference. We recommend citing outstanding partnerships between K-12 districts, community colleges and universities as models. Also consider encouraging and rewarding collaborations between math/science departments and teacher education departments. Recognition of outstanding accomplishments in all of these aspects would communicate information about best practices and also serve to bring greater recognition and respect to teaching.

The COV could not determine the balance of Noyce scholars across elementary, middle and high school. Secondary math/science teachers are a critical shortage for the nation. However, elementary and middle school teachers are critical in the formation of attitudes to math and science in children. Perhaps the solicitation could be expanded to include a phase of Noyce that focuses on the preparation of math/science elementary specialists or elementary and middle school teachers with an emphasis in math or science.

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

Overall the COV felt that the process was very well laid out. The COV was very impressed with the organization of the COV review process, including, the webinar, CD's, and materials in the review binder. The Program Officers were very helpful and responsive to the COV's questions and requests for additional material. Moreover, the writer assigned to the COV was very knowledgeable and helped move the review along. The COV commends the NSF staff for making the work of the COV a productive, collegial and enjoyable endeavor.

**C.6. How should Scholarship Programs such as Noyce address the issue of sustainability?**

Professional societies tend to define the coin of the realm in terms of what is valued in a profession. Developing opportunities for educational and scientific professional societies to link with the Noyce program may: 1) provide avenues for enhancing the national recognition of Noyce scholars; 2) introduce the scholars to a professional home where they can find inspiration and community, and 3) highlight potential funders and donors for funding Noyce scholars and activities at professional society meetings.

Ultimately, the drivers of sustainability must be embedded within practice and institutions. We have already suggested additional partnerships that would facilitate the embedding within

education (e.g., inclusion of community colleges in educational partnerships) and within fields of practice (e.g., inclusion of science and math teacher professional societies).

High pay is unlikely to ever be a motivation for becoming and continuing as a teacher but for many, a high level of respect is at least as motivating. Recognition programs and awards communicate respect for a field in important ways. What can the Noyce program do to enhance the standing of teachers in their communities?

Evaluation could also be a tool for sustainability if some component of it were reframed as learning with feedback loops. (This component would not replace impact evaluation.) Research demonstrates the increased effectiveness of real time learning in work settings that employ feedback practices. The websites mentioned above might contribute to this learning, and there could be many variations, as identified in EHR's Cyberlearning report. This activity contributes to evaluation by providing instances of helpful exchanges about solving problems in teaching, for example, that can be quantified (e.g., how many problems were solved? How frequently did Noyce teachers use this approach?). Feedback loops reinforce learning by bringing needs and effective approaches to consciousness, mental engagement and effective action, further reinforcing learning.

### **C.7. How can NSF build capacity to enable more institutions to participate in Noyce?**

The NSF may consider setting aside funding for particular groups of institutions that are underrepresented within the Noyce Scholars program. For example, given the role of community colleges in providing foundational coursework and serving a diverse population, the NSF could expand the ways community colleges can participate. Tribal colleges represent another opportunity. The NSF could also look for proposals that have especially strong partnerships among K-12, community colleges and higher educational institutions with the capacity to expand the pipeline.

More institutions could participate in Noyce if awards were to range in size and scope. For example, awards to community colleges may not need to have stipends as large as in other settings and the total award amount might vary. Awards could also engage students who may be in their first and second years in community colleges or four-year institutions.

Opportunities exist to support Noyce scholars in REU programs. We suggest that The NSF explore ways for Noyce scholars to participate in programs at marine biology and other field stations, both of which have national organizations.

During EPSCOR visits, we recommend the NSF consider bringing a Noyce program officer to participate in the briefings. Similarly, we recommend presentations on the Noyce scholars program to professional educational societies and professional scientific societies as noted above.

### **C.8. What are the key evaluation questions that should be covered in the next phase of the program evaluation?**

Evaluation of program outcomes is a critical future need for the Noyce program. As already mentioned, the 15-20% cap on non-scholarship/stipend funding limits evaluation possibilities within individual projects.

In addition, the only program-wide evaluation, completed by the University of Minnesota in 2009, was limited in scope. It collected data only through surveys and interviews. A most important aspect of this study is the series of recommendations for further study contained at the end of the report. The NSF might consider a contract to more thoroughly evaluate the entire portfolio of awards and to focus on the recommendations made for further study. Among the most important questions for study are longitudinal studies of Noyce recipients, comparative study of various program features and activities, investigations of the nature of support/mentoring and studies attempting to link Noyce scholars to increased K-12 student achievement. Additional questions include: Has the geographic distribution of grants continued to expand? Are there things that work in some settings and not in other environments? Are there any geographic or population factors at work? Has the Noyce scholarship program become more visible, attracting more applicants? Have strong partnership programs been funded? Has project evaluation received more attention? What can the NSF do to develop a tracking system for Noyce scholars into their teaching careers (e.g., through professional teacher organizations such as NSTA)? How can the NSF design a comprehensive report that summarizes results for Noyce and other programs designed to prepare, support and retain teachers in K-12 schools across the country?

**SIGNATURE BLOCK:**



---

For the Robert Noyce Teacher Scholarship Program FY 2005-2007 COV  
Anne Petersen  
Chair