

**EHR Response to the COV Report for the
Division of Research on Learning in Formal and Informal Settings (DRL)**

**CORE QUESTIONS and REPORT TEMPLATE
for
FY 2015 NSF COMMITTEE OF VISITOR (COV) REVIEWS**

Guidance to NSF Staff: This document includes the FY 2015 set of Core Questions and the COV Report Template for use by NSF staff when preparing and conducting COVs during FY 2015. Specific guidance for NSF staff describing the COV review process is described in the “COV Reviews” section of NSF’s Administrative Policies and Procedures which can be obtained at <https://inside.nsf.gov/aboutnsf/hownsfworks/rolesresponsibilities/Pages/Committee-of-Visitors.aspx>¹.

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. Committees 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 (2) managerial matters pertaining to proposal decisions.

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.

For programs using section IV (addressing portfolio balance), the program should provide the COV with a statement of the program’s portfolio goals and ask specific questions about the program under review. Some suggestions regarding portfolio dimensions are given on the template. These suggestions will not be appropriate for all programs.

Guidance to the COV: The COV report should provide a balanced assessment of NSF’s performance in the integrity and efficiency of the **processes** related to proposal review. Discussions leading to answers 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.** The reports generated by COVs are made available to the public.

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/>.

¹ The COV Reviews section has three parts: (1) Policy, (2) Procedures, and (3) Roles & Responsibilities.

FY 2015 REPORT TEMPLATE FOR NSF COMMITTEES OF VISITORS (COVs)

The table below should be completed by program staff.

Date of COV: March 30 and 31, 2015
Programs Included: <ul style="list-style-type: none"> • Informal Science Education (ISE)/Advancing Informal STEM Learning (AISL) • Discovery Research K-12 (DRK-12) • Innovative Technology Experiences for Students and Teachers (ITEST) • Promoting Research and Innovation in Methodologies for Evaluation (PRIME) • Mathematics and Science Partnership (MSP)/STEM-C Partnerships • Research on Education and Learning (REAL) <ul style="list-style-type: none"> ➤ Research and Evaluation on Education in Science and Engineering (REESE) ➤ Research on Gender in Science and Engineering (GSE) ➤ Research on Disabilities Education (RDE)
Division: Division of Research on Learning in Formal and Informal Settings (DRL)
Directorate: Directorate for Education and Human Resources (EHR)
Number of actions reviewed: 703 (661 competitive actions)
Awards: 124
Declinations: 539
Other: 40
Total number of actions within Program/Cluster/Division during period under review: 6,677 (6,290 competitive)
Awards: 1,122
Declinations: 5,240
Other: 315
Manner in which reviewed actions were selected: To create a sample of jackets, all actions ending in a “3” were selected for the sample. These included new awards as well as PI transfers and supplements.

COV Membership

	Name	Affiliation
COV Chair or Co-Chairs:	Dr. Gregory Camilli Dr. Margaret Honey	Rutgers University New York Hall of Science
COV Members:	Dr. Len Annetta Dr. Marilyn Carlson Dr. Douglas Clements Dr. Sandra Crespo Dr. Francis Eberle Dr. Jack Fletcher Dr. Preeti Gupta Dr. Marie Hoepfl Dr. Ramon Lopez Dr. Judit Moschkovich Dr. Ross Nehm Dr. Becky Wai-Ling Packard Dr. Terri Pigott Dr. Nichole Pinkard Dr. Leona Schauble Ms. Marsha Semmel Dr. Nancy Songer	George Mason University Arizona State University University of Denver Michigan State University National Association of State Boards of Education University of Houston American Museum of Natural History Appalachian State University University of Texas Arlington University of California Santa Cruz Stony Brook University Mt. Holyoke College Loyola University, Chicago DePaul University Vanderbilt University Noyce Leadership Institute Drexel University

EXECUTIVE SUMMARY OF THE COV REPORT

In this COV process, the committee was given a unique opportunity to think about the effectiveness of work in the Division of Research on Learning in Formal and Informal Settings (DRL) as a whole, not just in relation to specific programs and particular issues. As a result, the Division was the core focus of our deliberations and recommendations were based on themes evident in a number specific issues or concerns – particularly those that suggested a pattern or trend. The three highest priority recommendations that accumulated through this process of review are discussed below.

1. Division Strategy

The COV recommends following guidance put forth in EHR's strategic plan to "provide a sound framework for developing more coordinated programs of knowledge generation (encompassing projects across research types, including foundational, design and development, impact, scaling, and evaluation research) and achieving a balanced portfolio that supports an array of projects sufficient to fill gaps, generate knowledge, and drive innovative design." (*EHR Strategic Re-envisioning for the Education and Human Resources Directorate, 2014*)

To realize this, DRL should create a strategic document to address the following questions:

- ▶ What is the core focus of the Division?
- ▶ How does the Division's focus relate to the broader EHR vision?
- ▶ How does the Division conceptualize the complementary role of different research strategies?

This document should be designed to communicate to a broad range of stakeholders.

Response, May 2015:

In general, the Division concurs with and appreciates this recommendation. In the upcoming year (through June 2016) we will respond by (1) developing a timetable for a strategic planning process, (2) compiling relevant data, (3) engaging internal and external stakeholders in discussions, and (4) drafting one or more strategic documents.

Core Focus: The Division will work on a strategic document that outlines the core focus of the Division of Research on Learning in Formal and Informal Settings (DRL) as emphasizing research and development on STEM learning and learning environments for all learners across multiple settings. The portfolio of programs within DRL supports research and research and development projects that span early childhood, pre-K-12, and lifespan learning for all in formal and informal settings, including physical and virtual settings. The Division will continue to review its programs in light of the vision outlined in the strategic plan for EHR to capitalize on promising trends in STEM learning, create coordinated programs of research and effective partnerships, and develop a knowledge base of NSF-funded research on STEM learning and learning environments.

Relation to EHR Vision: As currently conceptualized, the EHR vision rests on three pillars: Learning & Learning Environments (L/LE), Broadening Participation (BP), and Workforce Development (WFD). As noted in the response above, DRL's investments focus primarily on L/LE. There are examples of awards that focus on the other two pillars, as well, and some that focus on multiple pillars (e.g., ITEST, which can be characterized as both WFD and L/LE). We also note that DRL is deeply engaged in the EHR-wide ECR program.

Role of Research: A concern noted from the COV is to help the field understand the focus of the Division with respect to how the portfolio of programs and the resulting awards cover the research space. DRL will work to develop a logic model for DRL toward that end. This document will outline the focus of the Division, and include a schematic that shows the portfolio of programs, describing each program and how it contributes to the overall portfolio. A second document will offer guidance on how to map DRL programs to the NSF/IES *Common Guidelines for Education Research and Development*, as well as alternative frameworks such as the Improvement Science approach.

2. Ability to Manage Toward Continuous Improvement

Support the continuous improvement of the Division's work through the development of a unified information management system that allows for the analysis of the portfolio and the review process in light of strategic goals (e.g., logic model).

- ▶ At submission of a proposal PIs and co-PIs should be responsible for submitting information that enables the Division and individual programs to readily describe the portfolio and to determine key characteristics of all submitted proposals (e.g., PI/co-PI field and specialty, past history of NSF awards, year since Ph.D., primary and sub-award institutions, target, audiences, area of focus, topic of STEM, grade levels, etc.)
- ▶ All NSF reviewers should be responsible for submitting information that enables the Division to analyze the reviewer population with regard to qualifications and expertise, including past history of NSF awards, field of specialty, years in field, home institution and primary role, and geographic and basic demographic data.
- ▶ Create a relational capacity for these two databases in which reviewer information and portfolio information can be linked and analyzed.

Response, May 2015:

1. DRL does not have its own IT department, so the Division needs to work within the constraints of the FastLane system. In the coming years FastLane will undergo revisions as it moves features to the Research.gov system. DRL will look for opportunities during this transition to allow PIs to submit detailed characteristics of submitted proposals. On a related note, EHR is looking at a process used by the BIO Directorate and the Division of Undergraduate Education (DUE) as a model. Both require PIs to complete a special form (the BIO Classification Form and the DUE Project Data Form) as part of proposals. For EHR, a PI could select items from a menu, such as grade level (or age) of target audience, topic of STEM, etc.

2. Reviewers presently have the ability to submit most of the information suggested here in FastLane when they register. However, submission of the demographic information is (by law) optional. Another Division in EHR hands out paper forms and asks the reviewers to submit similar information before a panel. The information is anonymous, so that although overall information of the panel reviewers is obtained, it cannot be matched to individual reviewers. This process has been successful at improving the quantity and quality of reviewer information for in-person panels, but will not work with virtual or hybrid panels. In addition, this information must then be entered into digital form manually. We will investigate the feasibility of implementing this process. In addition, DRL will take steps to make our reviewer orientation more deliberate in encouraging reviewers to enter their demographic information, and include stronger language in the letter we send to reviewers when they receive their proposal assignments.

3. The suggestion of the COV implies that a database of all proposals (not just awards) should be linked with a reviewer database. It is assumed that the goal of linking these

databases would be to determine whether or not the reviewer expertise is appropriate for the content of the submitted proposals. Because different panels have different types of proposals (e.g., one panel might have secondary mathematics professional development, while another panel has middle school earth science curriculum development), the relation would need to be done on a panel-by-panel basis. In other words, a single analysis of all reviewers and all proposals is not likely to produce valuable information. DRL currently has in place a procedure to ensure that the expertise of the reviewers is appropriate for a comprehensive and thorough review of submitted proposals. Program Officers provide the Division Director with a list of reviewers along with a summary of the reviewers' areas of expertise and demographic information (if available). Program Officers provide an explanation that describes how the reviewers' expertise matches the characteristics of the proposals to be reviewed. Program Officers also have copies of the reviewers' CVs that the Division Director can read if desired. However, it is not easy to capture and archive this process digitally. DRL will experiment with archiving the reviewer grids on the Division's SharePoint site and will provide the next COV with samples of reviewer grids. However, this issue is an EHR-wide concern. It would not be efficient for each Division to maintain its own reviewer database. As FastLane undergoes an anticipated redesign in the coming years, DRL will take advantage of any opportunities afforded to identify reviewer data in new ways.

3. Clarifying the Division's Core Intent/Interpretation of Broader Impacts – Given the Focus on Research

To ensure that the broader impact of the Division's portfolio is responsive to its overall strategic direction, the COV recommends that a specific DRL Broader Impact statement is developed. The COV recognized the comprehensiveness of NSF's merit review criteria, but thought it was important to further distinguish and clarify how a stronger research agenda within DRL informs Broader Impacts with respect to learning and learning environments, broadening participation, and workforce development based on the strategic plan.

Response, May 2015:

DRL recognizes the importance of Broader Impacts (BI). It views BI in three ways:

- As embedded in the research itself (e.g., through what can be learned, generative lines of inquiry, robustness of findings).
- As embedded in activities that are directly related to specific research projects (e.g., dissemination activities).
- As generated through activities that are supported by and complementary to the project (e.g., impacts on local schools participating in PD [while the PD is being studied]).

DRL agrees that additional clarification of the Broader Impacts criterion would be useful for its constituencies. Over the course of the next year, DRL will engage Program Officers in discussion to further clarify the above aspects of BI with examples of how each might be approached. The goal is to be able to provide prospective applicants with multiple ways to think about their project designs.

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(s) under review. Quantitative information may be required for some questions. Constructive comments noting areas in need of improvement are encouraged.

I. Questions about the quality and effectiveness of the Division's use of merit review process. Please answer the following questions about the effectiveness of the merit review process and provide comments or concerns in the space below the question.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
<p>1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?</p> <p>Comments:</p> <p>The review methods were generally appropriate. Despite the variance across panels, the overall panel review process worked well. The COV recognizes this variance is an important ongoing issue in the review process.</p> <p>There were differences in how certain reviews were carried out, and the committee noted in some instances that site visits or ad hoc reviews were not documented in the jackets provided to the COV members. This was a particular concern for supplements of larger amounts.</p> <p>The COV is interested in the ways NSF (and specifically the Program Officer (PO) guiding the review panels) can continue to encourage review panels to consistently report substantive, meaningful review comments on the merit review criteria – Intellectual Merit and Broader Impacts – and to specifically cite evidence provided in the proposals (e.g., previous publications or products especially those resulting from previous awards).</p> <p>Data Source: EIS/Type of Review Module</p> <hr/> <p><i>Response, May 2015:</i> The Division agrees that Program Officers should continue to ensure that all reviewers and panel summaries make substantive comments on both Intellectual Merit and Broader Impacts. We will continue to emphasize this in pre-panel webinars, panel briefings, and panels. NSF requires that prior support be discussed by panelists, including previous publications and products as well as other results in both intellectual merit and prior support. The templates used for panel summaries by the Division will continue to include this section. Program Officers will comment on prior support in review analyses, particularly for awards.</p>	<p>Yes</p>

<p>2. Are both merit review criteria addressed</p> <p>a) In individual reviews?</p> <p>b) In panel summaries?</p> <p>c) In Program Officer review analyses?</p> <p>Comments:</p> <p>Both merit review criteria were routinely addressed across all three types of documents. However, some individual reviews, panel summaries, and PO review analyses were more discerning than others with regard to a project's relative strengths and weaknesses in light of each review criterion.</p> <p>The COV noted considerable variation in PO review analyses, particularly for declined proposals. The COV encourages DRL POs to continue to provide substantive comments, when possible, to declined Principal Investigators (PIs). One cannot overstate the importance of feedback as a learning opportunity, especially to new PIs.</p> <p>Data Source: Jackets</p> <hr/> <p><i>Response, May 2015: The Division agrees. Division practice is to include substantive PO comments on all declines.</i></p>	<p>Yes</p>
<p>3. Do the individual reviewers giving written reviews provide substantive comments to explain their assessment of the proposals?</p> <p>Comments:</p> <p>Although there was a broad spectrum of detail in reviewer comments, the majority of individual reviews provided substantive comments. In a few cases, the reviewers' comments were too terse or did not provide comments that matched their overall ratings. Overall, however, the quality of individual reviews provided substantive detail for both awarded and declined proposals.</p> <p>Data Source: Jackets</p> <hr/> <p><i>Response, May 2015: The Division is pleased that most reviewer comments were substantive. As noted above, we will continue to remind reviewers of the need to write careful reviews that match the rating that they give and address NSF's Merit Review Criteria. The pre-panel webinars and the panel orientation slides will emphasize the need for substantive comments.</i></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>Generally, panel summaries effectively captured issues from individual reviews. In instances where individual reviews were brief or did not match their overall ratings, the panel summary often captured, to a greater extent, the nature and tone of the panel discussion.</p> <p>The COV noted that it was very helpful when panel summaries delineated the questions and concerns of the panelists because this provided a framework for any further agency review or potential negotiations. Similarly, the review analyses provided a more in-depth record of the discussion and ratings.</p> <p>Data Source: Jackets</p> <hr/> <p><i>Response, May 2015:</i> The Division agrees and will continue to ensure that panel summaries include the major issues and concerns of the panel under both Intellectual Merit and Broader Impacts, as well as prior support, the Data Management Plan and, if appropriate, the Postdoctoral Mentoring Plan. Panelists will continue to be told about these requirements in the pre-panel webinars and in orientation, and Program Officers are reminded of this by program leads before the panels.</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 the jacket usually includes a 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>The content of individual jackets varied. In general, the jackets included appropriate documentation for the award/decline decision. The review analyses were particularly helpful in explaining the award/decline decision.</p> <p>The COV observed several cases in which the funding decision varied from the panel consensus, and the COV would encourage that greater justification be documented in the records.</p> <p>The COV appreciated the flexibility granted to POs when conducting an additional review of proposals and their panel summaries. In an effort to increase transparency, the COV suggests that POs be asked to justify their decisions with respect to smaller awards that do not undergo the full panel review process (i.e., EAGER awards and large supplemental awards) and for awards where panelists raised significant concerns about elements of a proposal that necessitated substantive negotiations leading up to the award.</p> <p>Data Source: Jackets</p>	<p>Yes – usually</p>

<p><i>Response, May 2015:</i> NSF policy requires Program Officers to provide substantive reasons for disagreeing with the recommendations of panels or reviewers. This includes proposals where the panel ranking was Highly Competitive or where a reviewer gave an Excellent Rating for a decline. For an award, the Program Officer must provide substantive reasons for disagreeing with a Fair or Poor rating. The Division agrees that Program Officers should provide solid justification for awards where the proposal is not reviewed externally (EAGERs, Supplements, conference grants).</p>	
<p>6. Does the documentation to the 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 in the PO Comments field or emailed with a copy in the jacket, or telephoned with a diary note in the jacket) of the basis for a declination.]</p> <p>Comments:</p> <p>The COV encourages the Division to consider continuous improvement of the clarity, transparency, and documentation on the specific protocols or procedures NSF staff use to make funding decisions following the panel review period, especially with respect to funding decisions that exhibit some variance with panel and PO summaries. This should include the role of DRL’s strategic vision, documentation of NSF communications with PIs, guidelines for PO communications to PIs, reviews by other POs, and notes from the “likelies” meetings.</p> <p>Data Source: Jackets</p> <hr/> <p><i>Response, May 2015:</i> The Division agrees that continuous improvement in transparency, clarity, and documentation is important. Specifically, the Division will include in the Context Statements a brief description of the post-panel discussion done by Program Officers referred to as the “likelies” discussion (or meeting). Most DRL programs can fund less than half of the Highly Competitive proposals; thus post-panel review of these proposals is essential. To do that, Program Officers are asked to write analyses of these proposals, which we refer to as “second reads.” Following NSF policy, most of the discussion revolves around ensuring a balanced portfolio. Program Officers incorporate points from these discussions and the “second reads” into their review analyses and Program Officer comments.</p>	<p>Yes – usually</p>
<p>7. Additional comments on the quality and effectiveness of the Division’s use of merit review process:</p> <p>As noted above, the panel review process included a wide range of variation in the quality and focus of the reviews. This can result in apparent inconsistency because seemingly similar proposals received different reviews/ratings and different award/decline decisions. Continuing to provide reviewers with detailed</p>	

and concrete guidance on how to conduct high quality reviews should remain a high priority.

The COV suggests that negotiations, particularly those that result in changes to the budget or to the design of various aspects of the project, be better documented within the eJacket so that there is a transparent record of changes from the original proposal. The COV thinks that this process of documentation is beneficial, particularly when the documentation reflects and provides substantive commentary delineating a project's strengths and weaknesses in relation to the Division's top level priorities.

Response, May 2015:

As noted above, the Division will continue as a high priority to remind reviewers of the need for substantive, high-quality reviews and panel summaries that provide reasons for their ratings and recommendations.

NSF's systems do not collect resumes of reviewers. However, Program Officers do review resumes before recommending a slate of panelists to the Division Director. The PO is expected to follow NSF policy of selecting experts who are diverse in terms of race and gender, institutional affiliation, and geographical distribution. Panels should also have a mix of new and experienced reviewers. The PO summarizes the expertise and background of the reviewers on the DRL Panel Grid. As noted, we will provide a sample of these grids to the next COV.

The Division agrees that NSF policy requires documentation for any substantive changes in the budget as well as changes in the scope of the work. Budget revisions are submitted in FastLane, including a "budget impact statement" that describes the substantive changes in the budget. Program Officers are expected to summarize responses in the Review Analysis and to upload responses from PIs into eJacket.

II. Questions concerning the selection of reviewers. Please answer the following questions about the selection of reviewers and provide comments or concerns in the space below the question.

SELECTION OF REVIEWERS	YES , NO, DATA NOT AVAILABLE, or NOT APPLICABLE
<p>1. Did the Division make use of reviewers having appropriate expertise and/or qualifications?</p> <p>Comments:</p> <p>Overall, the Division made appropriate reviewer selections – ensuring diversity of reviewer expertise, institution type, and geographic area. The COV encourages the Division to balance participation among reviewers with research and methodological expertise and reviewers with complementary disciplinary expertise.</p> <p>More information could be collected about reviewers that could be useful to the Division going forward. To this end, the COV suggests that additional data be collected regarding reviewers’ expertise to increase transparency and to ensure proposals are reviewed by the appropriate experts. If reviewers are merely characterized as STEM experts rather than ascertaining specific expertise and experience, then an opportunity for management toward continuous improvement is lost.</p> <p>The COV strongly encourages the Division to work with others at NSF as well as other groups to resolve reviewer data collection problems with the goal of making it easier to collect data as well as increasing response rates. The COV suggests that the Division focus on the key, common data points that are most important and focus on increasing the data integrity of these points. These data can be useful in ensuring that there is a broad array of expertise among reviewers in terms of fields, past history with NSF, professional affiliation, etc. DRL should review the practices of other directorates and consult the appropriate experts prior to designing a data collection procedure.</p> <p>It may be necessary to further clarify the criteria NSF uses when selecting non-academic reviewers for panels. Additionally, the COV discussed the potential benefits of specific processes for evaluating the reviewers – for example, noting which reviewers provided more substantive and comprehensive reviews. This is a common practice for major research journals.</p> <p>There were a large number of reviewers (24% Division-wide) with unknown institution types. The COV believes this to be important data that informs the rigor of the review process and that can be used to ensure diverse participation.</p>	<p>Yes – usually</p>

<p>The COV appreciated the development and use of the Proposal Panel (Reviewer) Composition Form – DRL’s resource for explaining the rationale for panel composition. Some additional clarification of elements on this form would be helpful to further clarify DRL’s rationale.</p> <p>Data Source: Jackets</p> <hr/> <p><i>Response, May 2015:</i></p> <p>The recommendation to collect more data about reviewers was discussed above.</p> <p>The Division agrees that it is important to ensure that reviewers’ institutions are entered in the system in a timely fashion. The Division has the following procedure: (1) Program Officers provide the information to Administrative Staff; (2) Administrative Staff check that the institution is in the system when they set up a panel; (3) Program Officers check the review record before the panel for complete listings; and (4) panelists are asked to update this information at the beginning of a panel. The Division is pleased to note that for this Fiscal Year, institutions are listed for over 95% of the reviewers. The Division’s management will continue to remind all staff of the procedure.</p> <p>The Division will continue to use the DRL Reviewer Grid and will provide samples of these to the next COV. In accordance with NSF policy, Program Officers are responsible for considering expertise of the reviewers, type of organization, reviewer diversity, age distribution, and geographical balance in creating panels. The <i>Proposal and Award Manual</i> also notes that it is usually impossible to meet all of these criteria on a given panel, but POs are required to strive to develop a balanced panel.</p> <p>Program staff do discuss the quality of reviews by reviewers, and the Division agrees that those who do not provide substantive reviews should generally not be invited to review again.</p>	
<p>2. Did the Division recognize and resolve conflicts of interest when appropriate?</p> <p>Comments:</p> <p>Yes, the COV saw examples where conflicts of interest were appropriately recognized and resolved by panels and NSF.</p> <p>Data Source: Jackets</p>	<p>Yes</p>
<p>Additional comments on reviewer selection:</p>	

III. Questions concerning the management of the program under review. Please comment on the following:

MANAGEMENT OF THE PROGRAM UNDER REVIEW

1. Management of the Division and its programs.

Comments:

Overall, the COV noted a good amount of continuity among Division POs and significant effort by Division staff to compile data to describe programs and their outcomes. The COV concluded that the Division took great care to responsibly manage the programs under review.

The proposal dwell time was reasonable and the NSF standard was met.

The COV also noted some overarching concerns related to the COV's Ability to Manage Toward Continuous Improvement Recommendation, which may impact the Division and its programs:

- The absence of data collection mechanisms for both reviewer and PI information.
- The variety of different data monitoring systems across the Division's programs.
- A clear documentation of Division protocols for award/decline decisions during the POs' post-panel proposal reviews.

The COV suggests that additional information on the revised strategic plans and management plans as well as the driving components behind programmatic restructuring be articulated clearly by the Division for new DRL programs. This type of documentation would also help to capture key "lessons learned" and important data from sunset programs that will provide insight for the new program models. This information will also be helpful for any future Division-wide COVs to understand specific intentions and initiatives by Division management.

The COV appreciates the development and incorporation of DRL centers and resource networks and encourages the Division to consider the usefulness of supporting a single resource network for all DRL programs to create Division cohesion, serve as a resource for finding similar projects, assist with project data collection, attract new applicants addressing DRL goals, broaden the reach of DRL projects, disseminate findings, and enhance interdisciplinary connections among PIs.

Response, May 2015: The Directorate and the Division are considering ways to integrate the various networks and perhaps solicit one overarching network. There is a need to balance the particular requirements of the programs with the efficiencies of having a more unified approach. Another alternative is to have the networks work more closely with each other. An example of this was a 2015 Video Showcase where over 1,100 videos of funded projects were gathered and posted.

The Directorate-wide Evaluation and Monitoring Working Group is reviewing the various monitoring systems to see how they might be standardized and made more useful across the Directorate and Division.

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

Comments:

The Division was responsive to emerging research and education opportunities. The Division's solicitations provided evidence of responsiveness to cutting-edge issues. The COV thought the Division demonstrated an appropriate balance between research and education opportunities, and DRL was extremely responsive to emerging research.

The COV thinks it may be worthwhile to expand the types of reviewers on panels (particularly with attention to institution type) in an effort to ensure reviewers from numerous fields and focus areas are able to speak to a wide variety of emerging research and education opportunities.

For example, 6% of reviewers were from non-profits in a program in which 18% of applicants were from non-profits. Increasing non-profit reviewers could demonstrate a strategy for improving the range of awardees in informal learning contexts, particularly since Broader Impacts and broadening participation are Division-wide goals.

The COV encourages NSF to collect data on reviewers' institution type and perhaps make this a required category to collect from reviewers.

Additionally, the COV encourages NSF to expand the categories for institutional type in order to provide more specific information. For example, the non-profit category may be too broad to provide relevant data.

The COV noted the complexity of understanding core purposes across the Division's programs. Some proposals appeared to respond to many different areas within a solicitation, which may have impeded a truly innovative or promising concept. Yet other DRL solicitations may be overly prescriptive, potentially causing PIs to become risk-averse and refrain from proposing truly innovative proposals. A coherent approach is needed for communicating how to navigate these obstacles, both in terms of solicitations and standards for Intellectual Merit and Broader Impacts.

Response, May 2015:

As discussed above, the Division agrees that there needs to be diversity of institution types across the panels. The Division notes that non-profit organizations often have several proposals under consideration in the Division and therefore cannot have members serve as reviewers. The Advancing Informal Science Education (AISL) program strives to ensure that the panels have experts with informal learning who often come from non-profit organizations. Unfortunately, the categorization of "non-profit" is NSF-wide and the Division cannot change that in the official system. However, the program officers are aware of the diversity within that category and seek to match the institutional type of proposals with reviewers from similar institutions.

The Division recognizes that its solicitations vary in terms of prescriptiveness, openness, and complexity. This often reflects the goals of the program (e.g., a solicitation for foundational research would be less prescriptive than one for a research and development program like ITEST). Nevertheless, the Division agrees that more clarity and appropriate consistency are important goals and will consider these issues as staff revise current solicitations.

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

Comments:

The program balanced its reactive (agency and administration-led) and proactive (listening to the COVs and the field) goals in sound and responsible ways.

4. Responsiveness of Division's programs to previous COV comments and recommendations.

Comments:

In general, the COV felt NSF was responsive to the majority of previous COV comments and recommendations and attempted to address the concerns identified.

Previous COVs recommended continuing to improve the process for preparing panelists to address the merit review criteria. Although NSF provided webinars for reviewers, this COV observed that some reviewers continue to struggle with addressing the merit review criteria.

The Division has made initiatives to collect longitudinal data via external program evaluations. This COV believes the data collected for these evaluations will be important in both understanding and disseminating program and Division outcomes and successes as well as in providing information that can lead to refinements of future program solicitations.

Previous COVs raised concern about geographic diversity in some program portfolios. This COV encourages the Division to continue to reflect on proven methods, approaches, and strategies for increasing proposals and awards from Minority-Serving Institutions, Historically Black Colleges and Universities, and Hispanic-Serving Institutions; and to look for ways to broaden the geographic distribution of awards through initiatives like EPSCoR.

Response, May 2015: The Division agrees with this suggestion and continues to hold as a high priority increasing the diversity of its portfolio in terms of Principal Investigators and institutions.

IV. Questions about Portfolio. Please answer the following about the portfolio of awards made by the program under review.

<p style="text-align: center;">RESULTING PORTFOLIO OF AWARDS</p>	<p style="text-align: center;">APPROPRIATE, NOT APPROPRIATE, OR DATA NOT AVAILABLE</p>
<p>1. Does the Division’s portfolio have an appropriate balance of awards across disciplines and sub-disciplines of the activity?</p> <p>Comments:</p> <p>Based on the summary reports provided by the Division, the portfolio was diverse. However, the COV notes that more comprehensive data on project disciplines and focus areas is necessary in order to address the balance of DRL awards across disciplines and sub-disciplines (e.g., science education, technology education, engineering education, or math education).</p> <p>The COV requests that the Division provide a list of funded projects by discipline and sub-discipline whenever possible as it is a more useful indicator than counts of proposals and types of institutions.</p> <p>Based on available information, there were some gaps in content areas. The COV suggests that the Division pay particular attention to broadening the portfolio of awards, specifically in the areas of engineering, technology, math, chemistry, physics, and teacher professional development as well as projects that bridge the informal and formal sectors. The Next Generation Science Standards have a substantial emphasis on engineering, and there seemed to be very few proposals funded in that area.</p> <p>Data Source: EIS/Committee of Visitors Module. From the Report View drop-down, select the Funding Rate module to see counts of proposals and awards for programs. The Proposal Count by Type Report View will also provide a summary of proposals by program.</p> <hr/> <p><i>Response, May 2015:</i></p> <p>Many of the awards made by the division are multi-disciplinary. The Division will provide a more detailed breakdown of the sample of awards by discipline for the next COV using the emerging portfolio analysis tools.</p> <p>Since the portfolio reviewed by the COV covered three years before the NGSS were released, the number of proposals that specifically focus on them was limited. NSF does and will support proposals that address the issues raised by the Common Core, NGSS, and other College Readiness Standards, but does not require that proposals address these. The Division is interested in supporting Engineering Education Research and does have a number of awards in that area in ITEST, AISL, DRK-12 and ECR. NSF’s Division of Engineering Education and Centers (EEC) in the Engineering</p>	<p>Mostly appropriate</p>

<p>Directorate also supports such work. The Division will continue to collaborate with EEC in considering co-funding for awards. The Division does have a large portfolio of mathematics awards that might not have been included in the random sample. In addition, the Division is participating in the Directorate-wide call for proposals that support research and development of mathematical ability of high school students so they can successfully transfer to college-level courses.</p>	
<p>2. Are awards appropriate in size and duration for the scope of the projects?</p> <p>Comments:</p> <p>Overall, the COV agreed with the award size and duration of DRL awards.</p> <p>The COV suggests that NSF consider increasing the award duration of a small number of research awards to five years as this will support longitudinal research and allow projects additional time to understand and collect data on the impact of the project (e.g., for a multi-grade research <i>and development</i> project). If this suggestion is adopted, the COV suggests that NSF consider implementing a mid-point evaluation in which the last two years of planned funding are contingent upon demonstrated progress.</p> <p>Data Source: EIS/Committee of Visitors Module. From the Report View drop-down, select Average Award Size and Duration.</p> <hr/> <p><i>Response, May 2015:</i> The Division is considering whether there should be some five-year awards or whether the Division should make better use of other mechanisms, such as Accomplishment Based Renewals. The Discovery Research K-12 program is considering this suggestion in the revision of its solicitation for the FY 2016 competition. The Directorate-wide EHR Core Research (ECR) program does have five-year awards.</p>	<p>Mostly appropriate</p>
<p>3. Does the Division’s portfolio include awards for projects that are innovative or potentially transformative?</p> <p>Comments:</p> <p>Based on the sample of jackets reviewed by this COV, the Division's portfolio included projects that were cutting-edge and high risk. There was evidence of innovation and potential transformation.</p> <p>Data Source: Jackets</p>	<p>Appropriate</p>
<p>4. Does the Division’s portfolio include inter- and multi-disciplinary projects?</p> <p>Comments:</p> <p>Yes, several projects in the COV sample of jackets were designated as inter- and multi-disciplinary in terms of STEM content areas (e.g., geospatial and math, reading and science, hydroponics).</p>	<p>Appropriate</p>

<p>The COV thinks these projects are promising and encourages the Division to continue pursuing inter- and multi-disciplinary projects. Additionally, the COV reiterates the need for balance between broad inter-disciplinarity and deep expertise in specific disciplines.</p> <p>Data Source: If co-funding is a desired proxy for measuring inter- and multi-disciplinary projects, the Co-Funding from Contributing Orgs and Co-Funding Contributed to Recipient Orgs reports can be obtained using the EIS/Committee of Visitors Module. They are available as selections on the Report View drop-down.</p> <hr/> <p><i>Response, May 2015: The Division agrees.</i></p>	
<p>5. Does the program portfolio have an appropriate geographical distribution of Principal Investigators?</p> <p>Comments:</p> <p>There was appropriate geographic distribution of PIs and no evidence of geographical bias in the portfolio of awards.</p> <p>However, the COV encourages NSF to collect more comprehensive data by state to better understand how projects impact target populations; address the needs of underserved populations; and provide a more specific breakdown of projects focused on urban, rural, and EPSCoR locations.</p> <p>Data Source: EIS/Committee of Visitors Module. Select Proposals by State from the Report View drop-down.</p> <hr/> <p><i>Response, May 2015: In the breakdown of awards by state, we can identify projects in EPSCoR states. Over time, NSF's information systems and tools are evolving to provide deeper analytical capabilities. If future data mining and portfolio analysis tools permit a more comprehensive breakdown of award data by urban locations, rural locations, underserved populations, etc., the Division will provide these analyses to future COVs.</i></p>	Appropriate
<p>6. Does the Division's portfolio have an appropriate balance of awards to different types of institutions?</p> <p>Comments:</p> <p>Yes, the Division included a balance of awards across different institution types. The COV encourages the Division to continue to find creative ways to support partnerships with organizations that have less well-developed research infrastructures, but may nonetheless offer significant connections to underserved populations.</p> <p>Data Source: EIS/Committee of Visitors Module. Select Proposals by Institution Type from the Report View drop-down. Also, the Obligations</p>	Appropriate

<p>by Institution Type will provide information on the funding to institutions by type.</p> <hr/> <p><i>Response, May 2015:</i> The Division recognizes the importance of partnerships and supporting researchers from institutions with less well-developed research infrastructures.</p>	
<p>7. Does the Division’s portfolio have an appropriate balance of awards to new investigators?</p> <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>Based on the data available to the COV, awards to new PIs seemed to be approximately half that of seasoned PIs. There appeared to be a tendency in which seasoned proposers had an advantage in the review process. This tendency may arise, in part, from better proposals that in turn arise from more experience and better research support (e.g., more resources for proposal development). NSF should continue its efforts to encourage and support potential new PIs by providing information and/or opportunities to better understand the review process. One strategy could be to include new professionals as scribes during the panel review process. An additional strategy might be to use resource centers to actively help in the development and support of new PIs and/or to assist PIs who have been declined.</p> <p>However, it was unclear whether co-PIs were tracked and measured and whether that information figured into the data reviewed by the COV. Division staff should clarify what they think are appropriate targets for new PIs, and why. Currently, there is not an effective way for the COV to determine whether the number of new PIs is appropriate.</p> <p>The Division could consider conducting an analysis of the PIs/Co-PIs to examine the range of “success rates” for PIs. The COV also encourages the Division to continue providing new PIs with substantive feedback that clarifies why a proposal is declined. It is important to cultivate new researchers and to support their potential contributions to the field.</p> <p>Data Source: EIS/Committee of Visitors Module. Select Funding Rate from the Report View drop-down. After this report is run, use the Category Filter button to select New PI for the PI Status filter or New Involvement (PIs & coPIs) = Yes.</p> <hr/> <p><i>Response, May 2015:</i> Across NSF, the success rate for PIs who have not previously had an NSF award is lower than that for PIs who have previously submitted a successful NSF proposal (18% compared to 26% in FY 2014; see <i>Report to the National Science Board on the National Science Foundation’s Merit Review Process, Fiscal Year 2014</i> [NSB-2015-14], p. 15 and p. 61). This holds true in DRL also (9% success rate for new PIs compared to 16% success rate for prior PIs in FY 2014). The disparity in the</p>	<p>Limited data</p>

<p>success rates of new PIs and prior PIs in DRL is not out-of-line with what one sees in a number of other NSF units, giving some evidence of an appropriate balance of awards to new investigators. We remain committed to supporting both new and seasoned PIs. We routinely place new reviewers and new PIs on panels, assuming they have the necessary expertise, as recommended by NSF policy (specifically, NSF's <i>Grant Proposal Guide</i> [GPG] and internal <i>Proposal and Award Manual</i> [PAM]). As mentioned previously, we will continue to emphasize to reviewers and program officers the importance of providing substantive feedback on proposals that are declined.</p>	
<p>8. Does the Division's portfolio include projects that integrate research and education?</p> <p>Comments:</p> <p>Yes, most of the reviewed proposals incorporated both education and research components. The COV encourages NSF (and specifically review panels) to be sensitive to research methodologies that are appropriate for the project. The COV believes that the separation of research and program offerings in education is artificial. Longer-term education projects should incorporate complementary design/analysis or evaluation methodologies through the research cycle.</p> <p>Data Source: Jackets</p> <hr/> <p><i>Response, May 2015: The Division agrees.</i></p>	<p>Appropriate</p>
<p>9. Does the program portfolio have appropriate participation of underrepresented groups²?</p> <p>Comments:</p> <p>With respect to race and gender, underrepresented groups were well-represented within the Division's portfolio. However, the COV notes that a clearer definition of "underrepresented" may be warranted to better understand which groups and at what level (PIs, participants, etc.) are underrepresented for a given program or Division.</p> <p>The COV also noted the large number (81%) of PIs who did not report race/ethnicity information; therefore, the COV was unable to provide a complete and accurate response to this question.</p> <p>Data Source: EIS/Committee of Visitors Module. Select Funding Rate from the Report View drop-down. After this report is run, use the Category Filter button to select Women Involvement = Yes or Minority Involvement = Yes to apply the appropriate filters.</p>	<p>Data not available</p>

² NSF does not have the legal authority to require principal investigators or reviewers to provide demographic data. Since provision of such data is voluntary, the demographic data available are incomplete. This may make it difficult to answer this question for small programs. However, experience suggests that even with the limited data available, COVs are able to provide a meaningful response to this question for most programs.

<p><i>Response, May 2015:</i> The Division agrees that it is unfortunate that so few of the reviewers provide the data on race and ethnicity. This is, of course, their right. However, the Division will be more consistent in reminding reviewers of the importance of the information and requesting that they provide it, and we will include that request in pre-panel webinars and in orientation.</p>	
<p>10 Are the Division’s programs as a whole relevant to national priorities, agency mission, relevant fields and other constituent needs? Include citations of relevant external reports.</p> <p>Comments:</p> <p>Yes, the Division’s programs were relevant to national priorities, agency mission, and relevant fields. Program solicitations included all of the major citations referencing these priorities.</p> <p>Data Source: Jackets</p>	<p>Appropriate</p>
<p>11. Additional comments on the quality of the projects or the balance of the portfolio:</p>	

OTHER TOPICS

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

The COV discussed how findings from DRL research projects were getting out to the community, and whether results were used as research rationale for future proposals. The COV learned that the new reporting systems track journal publications, but not other forms of dissemination, which could also be important to track.

Response, May 2015: The reporting system used by NSF is on Research.gov and cannot be modified by DRL. However, Principal Investigators do submit other types of reports and materials to Program Officers. Program Officers should upload this information into eJacket.

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

The COV touched briefly on the need to clarify the distinction between research and evaluation. For example, what role does evaluation have in proposals that are entirely research based? When does it make sense for a proposal to include an evaluation component and do evaluators still demand a standard 10% of the budget?

Response, May 2015: DRL does not specify in any of its solicitations the amount that should be spent on evaluation. The Division believes that evaluation of research programs should serve the purpose of peer review. That is, the external experts should review the project to ensure that it was carried out in appropriate ways, that the conclusions are based on the data, and that the methods were appropriate for the research questions.

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

The Directorate should be commended for its efforts to work closely with other Federal agencies involved in education research, such as the Institute of Education Sciences and the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development. These efforts should continue.

Response, May 2015: The Division agrees. Continuing efforts of inter-agency collaboration, for example, through the OSTP-coordinated Federal Coordination Committee on STEM education, continue and will provide additional opportunities for such collaboration.

5. Please provide comments about major gaps or significant overlaps among the programs in the Division.

The changes to some programs in the Division raised some concerns among a group of COV members. There was concern that constant change and reorganization could make it more difficult for the Division to remain responsive to the field. The community is fairly unaware of the scope of many of these changes, such as the dissolution of Research on Education and Learning and the establishment of EHR Core Research (ECR) as a core program across the Directorate. The COV feels the field could benefit from understanding how this specific change will play out in

- a) the proposal preparation and review process,

- b) the process for determining which research proposals will be deemed more appropriate for the ECR program, and
- c) how Broader Impacts and Intellectual Merit may be interpreted differently in ECR than in other programs focused on application and addressing immediate utility for a large number of teachers and students.

The COV encourages the Division to be particularly mindful of these issues and of its strategic goals when writing future solicitations as well as when providing guidance to panels. Communication out to the field should also be a high priority.

Response, May 2015: The Division agrees that these are important areas of consideration. While ECR was not reviewed by this COV, the Division and Directorate do recognize the need for more publicity about the program. The issue of Broader Impacts for ECR will be part of the larger discussion of the meaning of Broader Impacts in research and development programs.

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

Additional COV recommendations include the following:

- ▶ Clarify the characteristics of “innovative” DRL initiatives – the COV notes that innovation may be interpreted differently across DRL programs. Ideas put forth in the COV include:
 - Interdisciplinary focus
 - Cross-sector collaboration
 - Transformative research
 - Novel, higher-risk research that is not simply incremental
- ▶ To recognize the significantly stronger impact that five-year grants can contribute in core research areas, consider increasing award duration of a small number of research awards to five years with a mid-point evaluation.
- ▶ A core component of the continuous improvement process should involve evidence-informed practices for increasing the number of new PIs.
- ▶ Ongoing and effective communication, both internally and externally, to the field as a whole around the Division’s strategic priorities.
- ▶ Continue the emphasis on strong, mixed research methodologies.
- ▶ Because some projects are more incremental, the balance between innovation and application needs to be thought through.

Response, May 2015: These issues have been discussed above. The Division does want to support strong research, whether it is quantitative, qualitative, or mixed-methods. The research design must fit the research questions. The Division also recognizes that there must be a balance between innovation and continuation of excellent work.

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