

**PROGRAM RESPONSE TO THE
FY 2012 NSF COMMITTEE OF VISITORS (COV) REVIEW
OF THE
RESEARCH AND EVALUATION ON EDUCATION IN SCIENCE AND ENGINEERING
(REESE) PROGRAM**

Date of COV: September 20–21, 2012

Program Response: February 2014

On September 20-21, 2012, a COV was convened to review activities in the Research and Evaluation on Education in Science and Engineering (REESE) program during FYs 2009–2011. The program directors thank the COV members for their thorough review of the program, for their many positive comments, and for their recommendations. This response addresses the recommendations included in the COV report. Responses are organized according to the order provided by the FY 2012 Report Template for NSF Committees of Visitors.

EXECUTIVE SUMMARY

I. QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS

- 1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?** **YES**
Overall the review process was sound.
- 2. Are both merit review criteria addressed?** **YES**
Overall, the merit review process seemed thorough and appropriate.
- 3. Do the individual reviewers provide substantive comments to explain their assessment of the proposals?** **YES**
Yes, in all cases reviewed the individual reviewers provide substantive comments to explain their reviews, including strengths, weaknesses and suggestions for improvements to be addressed by PIs. The substantive comments and thorough assessments of proposals provide educative feedback for PIs.
- 4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)?** **YES**
Overall the panel summaries were found to be thorough and robust.
- 5. Does the documentation in the jacket provide the rationale for the award/decline decision?** **YES**
As a package – the jackets provided substantive evidence for award or decline. The combination of all these steps makes for a thorough and deliberative process.
- 6. Does the documentation to PI provide the rationale for the award/decline decision?** **YES**
The documentation to PIs provided adequate explanation for funding decisions.

7. Additional comments on the quality and effectiveness of the program’s use of merit review process:

The PO review analyses and correspondence for proposals that were ultimately accepted were impressive. The POs’ analysis of the research and suggestions for modifications to the projects based on the expert recommendations and the PIs’ responses seem to have resulted in more refined projects. Given the goals of the program in funding multidisciplinary work, the negotiation is helpful in supporting researchers working together across fields and extending their work into new fields.

COV Recommendations: None.

II. SELECTION OF REVIEWERS

1. Did the program make use of reviewers having appropriate expertise and qualifications? YES

REESE should be commended for assembling a combination of Ad Hoc reviewers and panelists with breadth of expertise needed for funding decisions. ... The COV noted that increased attention to quality of research methods was a recommendation in the 2009 COV Report, and that there was clear evidence of attention to this recommendation in the review process. There was also a good deal of diversity in choice of institutions, disciplines, and level of position (such as assistant, associate, or full professors) for panelists. The COV noted that the multidisciplinary nature of REESE’s funding mission creates a need for a broad range of types of expertise, and feels it is critical to REESE’s success to continue to solicit panel members and reviewers that encompass behavioral sciences expertise, methodological expertise, and subject-matter specific research (research in the teaching/learning of science, mathematics, and engineering).

2. Did the program recognize and resolve conflicts of interest when appropriate? YES

Yes, when a conflict of interest was indicated, documentation shows that the PO noted the conflict and the panelist left the room during the discussion, and the conflict was noted in the system.

Additional comments on reviewer selection:

The COV commends REESE on their multi-step deliberative process for proposal reviews. The COV found that the POs exercised their expert judgment in both cases where proposals were ultimately funded or declined. Upon review of the award decision, the COV found the decisions to be appropriate. The COV felt that funding simply based on reviewer recommendations and average reviewer scores would be less effective than the current process. The COV found cases in which the reviewers and/or panel failed to identify potentially transformative and/or innovative research projects that were then identified in subsequent discussions within the program staff.

COV Recommendations: None.

- **Program Response:** We fully intend to continue our deliberative process going forward in REAL, including our use of ad hoc reviews. We find the discussions among the program directors to be critical to the process, allowing us to draw on multiple expertises, which are necessary for evaluating such multidisciplinary projects.

III. MANAGEMENT OF THE PROGRAM UNDER REVIEW

1. Management of the Program

COV Recommendation: The COV recommends that NSF address the increasing demand for funding and staff for REESE-related research, which has nevertheless managed to recruit, select, and fund research programs of consistently high quality through a careful deliberative process, and provide sufficient program resources for the REESE-related research goals in the REAL program.

- **Program Response:** The REESE program staff appreciates the COV's recognition that, in the face of steeply increased proposal pressure, the program's funding and staff have been disproportionately reduced relative to resources available elsewhere in the directorate. Ultimately, such decisions are not made at the program level; they are part of the strategic planning and annual budget formulation processes at the directorate level, where many competing needs must be weighed. Nonetheless, it is notable that an additional program officer has recently been assigned to REESE.

COV Recommendation: In the reorganization process, NSF needs to consider how to craft a PI meeting structure that leverages the research communities involved in REESE, RDE, and GDE without losing the coherence and utility of the REESE PI meetings for its grantees.

- **Program Response:** The program's last PI Meeting, in FY 2011, was widely recognized as the most successful ever. Nonetheless, because of new government-wide efforts to curtail conference spending, current thinking is that we should hold smaller, more targeted meetings instead of broad PI meetings. While we may lose some of the advantages of holding the larger meeting, we believe that targeted meetings will allow us to focus on just those points of overlap among the RDE, GSE, and REESE communities that the COV alludes to. This has the additional advantage of allowing us to make contact with PIs from other relevant programs and communities. For example, we could engage researchers on deaf education who have awards from SBE or CISE programs, in addition to those who have REESE or RDE awards. Another advantage to holding smaller meetings is that they can occur more frequently and likely will lend themselves to a variety of formats, taking advantage of new technologies. Finally, smaller PI meetings will, of course, be less expensive.

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

The COV noted the presence of an evolving set of program target areas in the years under review. The presence of the neural basis of STEM education and learning as well as cyberlearning are two areas that have arisen in response to new opportunities in theory building and emerging education research opportunities. The COV judged the areas identified to be important foci worth pursuing. The COV agreed with perspectives expressed by program staff that the strand method of solicitation can be a more effective strategy for recruiting high quality proposals in emerging areas than a more open-ended call for research.

COV Recommendation: It is important for REESE to remain responsive to emerging issues. We recommend periodically convening a panel of experts to advise the selection of target areas that push fundamental theories that have relevance to STEM learning practice.

- **Program Response:** Gathering well-informed views about target areas and emerging issues from experts in the field is a terrific idea. We can do this through sessions at PI conferences, workshops sponsored by grantees, and professional society meetings, as well as at our panel meetings for reviewing proposals, where we receive feedback from our expert reviewers about the gaps they perceive in the pool of proposals and in the solicitation. COVs—although they are only convened every few years—also provide advice on the direction of the program through their examination of the portfolio of awards. Federal policies also allow us to solicit advice through formal processes such as the EHR Advisory Committee or a notice in the *Federal Register*. The EHR Advisory Committee provides guidance to the directorate and is now being organized around four areas of research activity: STEM Learning, STEM Learning Environments, Broadening Participation, and Workforce Development in STEM. We will draw heavily on the Advisory Committee’s advice regarding emerging issues in these four areas.

COV Recommendation: The COV recommends that the approach of targeting particular strands be continued in [REAL], given the success of this strategy to date in REESE.

- **Program Response:** We strongly agree. We believe that the strand (or emphasis area or target area) approach has many advantages: First, as noted above by the COV, it is a way of alerting the field as to emerging target areas, of avoiding our getting proposals going over the same old ground. Second, proposals and PIs are not spread evenly across the space of issues that need addressing. Far from it, they tend to clump into areas due to a range of sociological and intellectual reasons. Having strands allows us to call attention to particular fields of importance. Third, having strands is a way of communicating to the field in a more expanded fashion what the mission of the program is, as distinct from those of other programs within NSF and other agencies. Finally, and relatedly, it is a way by which the program can communicate to members of research communities who do not think of themselves as STEM education researchers (writ large) that they are invited to submit. They are more apt to see that their work is relevant and welcome.

The COV also discussed specific future directions that are important. We noted that the current STEM context involves significant changes in the education system arising from the Common Core State Standards (CCSS) in Mathematics and English Language Arts (ELA) and the Next Generation Science Standards (NGSS),

COV Recommendation: The research program should acknowledge that the changing landscape in the world of practice offers extraordinary research opportunities and can have implications for the fundamental research questions that should be pursued under REESE. The COV recommends that REESE solicit proposals (a) for fundamental research in STEM learning related to these efforts and (b) studies of implementation of these efforts

- **Program Response:** We agree with the COV’s recommendation. We actually had such a strand in a previous version of the solicitation, but we took it out of the last version under pressure to reduce the number of strands and in the belief that such proposals could still be submitted under one of the other strands (e.g., the Secondary Analysis of Large Datasets strand or the Research on Diffusion strand). We received such proposals for the recent competition, but the fact that the COV did not recognize that they were invited, and certainly did not see them as an area of emphasis, underscores the need for us to provide clarification in the REAL

solicitation. We will also pursue efforts to work with other programs, at other levels of scale, on such questions. Finally, we note that actual scale-up or implementation studies are beyond the scope of the REESE program given current levels of program funding. They are, to some extent, appropriate to programs such as DRK-12 and MSP, but even more so to programs in the Department of Education's Institute of Education Sciences (IES). However, we do believe that studies "at scale" would have critical value (e.g., MOOCs).

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

COV Recommendation: The sound program planning and prioritization processes employed by the REESE program should be integrated into REAL program management practices. See COV Recommendation under Section III Question 2 regarding the use of expert panels to identify emergent funding strands to be called for in solicitations.

- **Program Response:** We are engaging in similarly careful planning and prioritization processes in the creation of REAL.

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

The COV team commends the REESE program staff for its overall responsiveness to previous COV comments and recommendations.

COV Recommendation: Attention to methodological rigor, as well as expertise in both behavioral sciences and STEM subject matter learning expertise, should be continued in the REAL program.

- **Program Response:** We fully agree. Indeed, the latest program officers to join the program have particular expertise in methodology and data analysis. This bodes especially well for REAL.

COV Recommendation: Attention to emergent research areas – including, but not limited to, cyberlearning, the neural basis for learning STEM, measurement, and policy implementation – should be given appropriate attention in the new REAL solicitation and resulting portfolio of awards.

- **Program Response:** Again, we fully agree with the COV's recommendation and will strive to make our attention to these research areas clear.

Regarding the recommendation [of the 2009 COV] that REESE explore options to increase the currently low rate of minority participation, the COV learned of some initial promising planned efforts in the 2012 update to REESE program response to the FY09 COV Report and in conversations with REESE program staff.

COV Recommendation: The program should provide evidence of its activities and outreach, aimed at broadening the participation of HBCUs and other MSIs in the REESE program and REESE-funded projects and continue activities aimed at increasing the number of successful proposals from underrepresented scholars.

- **Program Response:** We are following up on the activities begun in FY 2012 that the COV alludes to. We further believe that REESE's merger with RDE and GSE in REAL brings with

it program staff from HRD with experience and expertise in precisely these kinds of outreach efforts. We look forward to learning of additional strategies that we were not previously aware of. We also have plans for outreach workshops on the REESE (now REAL) program. We further note that the Broadening Participation Research strand in REESE complements similar efforts in other programs in the directorate as well as the Science of Broadening Participation program in SBE. We will work in the coming years to coordinate our activities with others around the agency (we have begun this process by co-sponsoring a DCL with SBE on the Science of Broadening Participation). Finally, REAL program officers are strongly linked with the new ECR program and its efforts to sponsor foundational research on Broadening Participation in STEM.

IV. PORTFOLIO REVIEW

The COV found the program to have a clearly defined funding mission, important in the broader mission of the NSF, and defined convincingly in terms of significance and broader impact. Its evaluation of the portfolio found the projects reflective of the goals of advancing theory in fundamental issues of STEM learning with the potential to inform improvements in STEM education. The COV judged the REESE program to be successful in funding high quality research with varying impact targets and content areas; it applauded the breadth of the REESE portfolio and noted a number of characteristics reflecting attention to the balance of the portfolio, including awards supporting an appropriate balance of: (1) new PIs, (2) multidisciplinary teams and projects, (3) diverse content areas and topics, and (4) institution types. Additionally the COV noted the evidence it found of attention to funding transformative research, and the high impact of REESE-funded work on the broader research community through scholarly publications. The COV also noted the program's success in funding high quality proposals from new investigators; commended the program for initiating investigator outreach efforts; and underscored the priority attached to identifying and funding foundational research conducted by investigators from diverse backgrounds.

COV Recommendation: The COV recommends that REESE continues its efforts to identify, support, and mentor investigators from typically underrepresented racial/ethnic groups and diverse institution types.

- **Program Response:** We are pleased the COV finds REESE's efforts to construct a well-balanced portfolio of high-quality research projects successful, and we welcome the COV's support for continuing efforts to identify, support, and mentor investigators from both diverse types of institutions and typically underrepresented groups. We will continue to monitor the impact of our efforts to identify, support, and mentor such investigators, and we will work to increase their awareness of the research opportunities that any future incarnations of the program present. Among other things, we will seek opportunities to extend awareness and encourage submission of proposals by investigators from typically underrepresented groups and diverse institutions by (a) collaborating with GSE and RDE program staff on outreach initiatives, (b) leveraging funded investigators' networks in these and other EHR programs (e.g., the Louis Stokes Alliances for Minority Participation [LSAMP] program, the Historically Black Colleges and Universities-Undergraduate Program [HBCU-UP], and the Tribal Colleges and Universities Program [TCUP]), and (c) encouraging NSF-supported research networks for REESE and other EHR programs to use the communications resources

at their disposal to share information about REESE-related research opportunities in the REAL program.

The COV commended REESE for the multidisciplinary nature of funded projects' research teams; it found the implementation of the FIRE solicitation to foster interdisciplinary collaboration was an important step in explicitly promoting interdisciplinary research. While noting the attention it found across the portfolio to important areas within STEM fields, the COV agreed with the program's strategy of funding the highest quality work with attention to balance among areas as a secondary consideration.

The COV underscored the importance it attached to evaluating the portfolio in terms of the unique program goals of REESE, highlighting the particularly important niche the program occupies in contributing to foundational knowledge and theories of STEM learning that have the potential for improving STEM education. It commented on the usefulness of making the pathways through which REESE research is (or could be) affecting practice in teaching and learning explicit in the program's logic model. The COV also discussed various indicators it had confidence would reveal important impacts of the REESE research portfolio, and encouraged NSF to consider exploring such indicators.

COV Recommendation: The COV recommends that REESE develop indicators of broader impact, and commission an investigation of the influence of REESE project funding on practice and learning, including, but not limited to: (a) products developed by REESE projects that have a direct impact on practice and learning; (b) the impact of foundational research funded by REESE on downstream projects, such as development of tools and resources in DRK-12 work, implementation or intervention studies funded by the IES and other agencies; the impact of research from REESE and predecessor programs on recommendations for practice and/or policy in NRC consensus reports.

- **Program Response:** We have a deep interest in documenting the outcomes of the REESE program and its constituent projects. We welcome opportunities to build on the Foundation's commitment to the broader impacts of the work it funds, and to contribute to efforts to document, monitor, and critically assess its impacts and influence. We are concerned, however, that developing indicators suitable for monitoring the impacts of REESE research on multiple target audiences in the short and the long run and commissioning the type of investigation the COV recommends would not only require the commitment of considerable resources but also are efforts the program would not benefit from pursuing in isolation. We propose to pursue with EHR's Evaluation and Monitoring Workgroup strategies for collaborating with other programs and units to build on current and planned future metric development initiatives. We believe such integration would be invaluable not only in leveraging evaluation and monitoring resources but also in facilitating cross-program portfolio analyses and impact assessments, and longitudinal assessments of the impacts of REESE-related research in REAL and future programs. Similarly, we propose to raise with the Evaluation and Monitoring Workgroup the feasibility of conducting cross-program assessments of the impacts of foundational research and other research products (potentially sampling projects to be followed longitudinally) as part of broader evaluation and monitoring initiatives in the directorate.

In considering the broader impacts of the REESE portfolio, COV Members concurred that more outreach, synthesis reports, and briefings could help ensure that findings of REESE awards are

broadly disseminated and utilized by both practitioners and policymakers to maximize program impact.

COV Recommendation: The COV recommends REESE continue to fund outreach and synthesis projects that have the potential to offer a high return by increasing knowledge sharing and the visibility of program impacts.

- **Program Response:** We concur with the COV’s assessment of the potential of outreach and synthesis projects to increase knowledge sharing and the visibility of program impacts, and we will request that provision be made for continued funding of synthesis and outreach projects in the REAL program solicitation.

V. OTHER TOPICS

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

The COV reiterated the important research opportunities for the REESE program and NSF created by the Common Core State Standards (CCSS) in Mathematics and English Language Arts, the National Research Council’s Framework for K-12 Science Education, and the forthcoming Next Generation Science Standards (NGSS).

COV Recommendation: NSF should consider the implications of the changing landscape in the world of practice and determine how its research programs in STEM education can support and study these important changes arising from the framework and standards efforts. While the COV was charged with reviewing the REESE program in particular, the COV felt that both the DRK-12 and REESE programs could have a clear role to play in supporting important research that can help guide and learn from the implementation of the new standards. The COV recommends that NSF explore how its programs can best provide the foundational research (e.g. via REAL funding) and resources and tools (via DRK-12 funding) to support the implementation of the new standards, and to learn from the early successes and challenges in implementation to guide future implementation.

- **Program Response:** We agree with the COV’s assessment of the potential of REESE research initiatives (eventually, REESE-related research in REAL) to support changes in educational practices associated with these recent and pending framework and standards efforts. To help ensure REESE research is able to inform and support these changing practices, we will (1) seek opportunities to identify and extend awareness of appropriate findings in collaboration with communications experts in NSF’s Office of Legislative and Public Affairs and NSF-supported research networks for REESE and other EHR programs, and (2) highlight the program’s interest in supporting future research that can help guide and learn from the implementation of the new standards in the REAL program solicitation. Additionally, REESE program staff will share the COV’s recommendation with other EHR colleagues so that they, too, can consider opportunities to support and study changes in practice associated with the new and forthcoming framework and standards.

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.

The COV discussed the impending integration of the REESE, RDE, and GSE portfolios into a new program to be called REAL. The COV felt that the REAL program could offer an opportunity to enable the communities typically tapped by the three programs to better leverage one another. However, REESE currently occupies a unique niche, bridging foundational research with the needs of practice. The COV has some concerns about the ease of integrating programs that have traditionally had different emphases on basic research, application, and development of tools and programs. The COV felt that it is critical that NSF maintain the goal of REESE funding basic innovative research.

COV Recommendation: NSF needs to maintain the research funding mission of the REESE program in the new configuration of programs; the new program should aim to fund innovative research “at the frontiers of STEM learning and provide the foundational knowledge necessary to improve STEM learning in all contexts.”

- **Program Response:** We appreciate the COV’s concern for maintaining the REESE program’s commitment to continued funding for basic innovative research in future instantiations of the program. We will ensure that this concern is shared with other EHR staff to inform the mission of the REAL program and the development of the REAL solicitation, as well as efforts to define and develop the “R&D core” of the directorate.

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

COV Recommendation: The COV recommends that for future COVs, all COV members receive the review template at least 2-3 weeks prior to the COV meeting, so that the committee can become familiar with the questions they will be addressing. We also recommend that the portfolio of jackets be made available two weeks in advance, and that it be made clear to the COV members that advance review of the jackets according to the questions in the template is needed. This would enable the COV to make preparations to divide up the review of jackets in a reasonable fashion and accomplish the jacket review prior to arriving in DC. Then the meeting time can be devoted to a more focused discussion of what the COV members have learned in their jacket reviews, and to the substantive issues raised in the template.

- **Program Response:** We appreciate the COV’s thoughtful recommendations for improving the COV review process, and we will look forward to acting on them beginning with the next (2015) COV review. Although it will be up to the COV chair and members to decide what materials they would like to review in advance of the meeting and how they would like to pace their work, we will share with them this COV’s recommendation and will strongly urge them to review the jackets, at the very least, in advance of the meeting. We also recognize that we could have done a better job annotating the information that was made available in advance of the meeting, to make it clearer how it could be used.