NSF Staff Response to the
Committee of Visitors (COV) Report for the

Discovery Research K-12 (DRK-12) Program

Date of COV: September 19–21, 2012
Program Response: January 2014

COV Recommendations: The COV noted that there were no panel reviews [panel summaries] for proposals which received low ratings. The reason for this should be made clear to the next COV before they begin the review process. The COV should be made aware of what is communicated to Principal Investigators (PIs) in cases where no panel reviews [panel summaries] are provided. The COV recommends adding explanations in panel summaries when panel discussions of proposals do not occur.

Program Response (January 2014): When there is no panel discussion of a proposal (and hence no panel summary), the program officer writes a "PO comment" to the PI, which the PI can view in FastLane. We will make sure that the next COV understands the process by which the program makes a decision not to discuss low-rated proposals.

COV Recommendations: Broader impact as a criterion is often interpreted differently among reviewers and panelists. For example, broader impact was addressed by some as impact for students whereas others addressed broader impact with regard to theory and dissemination of research findings.

- The COV recommends having K-12 practitioners as reviewers on the panel to help address this issue.
- Training via webinars for reviewers and solicitations to further explain the BI criteria may help to address this issue while still maintaining consistency with the broadly applicable merit review criteria for NSF.

Program Response (January 2014): NSF intentionally tries not to be overly prescriptive about the meaning of the Broader Impacts criterion in particular programmatic contexts. We expect PIs to propose what the broader impacts of their project will be, and we expect reviewers to evaluate the broader impacts as articulated in the proposal. In addition, we hope that reviewers will identify other potential broader impacts if they view the context of the proposal or the program differently. We have included NSF's standard language describing the Broader Impacts criterion in our solicitations and in instructions (including webinars) for reviewers. We will continue to discuss this criterion with reviewers and will encourage dialogue among them about possible interpretations of broader impacts in the context of the program.

COV Recommendation: The COV noted that not all responses to PIs of declined proposals included suggestions pertaining to improving proposals for resubmission. The COV recommends providing suggestions for improving proposals that are competitive but could not be funded. This would be beneficial to the PIs.

Program Response (January 2014): Program officers frequently communicate with PIs by phone, e-mail, or in person after a proposal has been declined. We will ensure that the documentation in proposal records more consistently reflects the suggestions for improvement that the program officers provide.

COV Recommendation: There is a concern that some of the proposals may be reviewed without attention to content correctness. The lack of attention to content correctness may be due to an imbalance of discipline expertise represented on panels, etc. (math, science, engineering, and technology as well as appropriate breadth of sub-disciplines). DRK-12 should work to increase the representation of varied expertise among reviewers on panels to ensure that all proposals are reviewed by experts in the STEM content of the proposal.

Program Response (January 2014): DRK-12 panels usually require a balance of disciplinary content experts, educational researchers and developers, evaluators, and people with deep knowledge of teaching. As the COV noted, reviewers with disciplinary expertise are necessary in the composition of the panels and ad hoc review. We will be attentive to this issue to ensure that proposals receive reviews that match their content.

COV Recommendation: K-12 educators/specialists tend to be underrepresented as reviewers. The COV suggests that practitioners/administrators who are instructional leaders are added to panels.

Program Response (January 2014): We concur that for many panels, people with experience in K-12 education are needed. It is often difficult to recruit well-qualified, active K-12 educators to serve as reviewers, but we will continue to look for effective ways to do so. Often the same expertise can be brought by university faculty with significant experience as K-12 teachers and administrators.

COV Recommendations: The COV wonders if there is an intentional recruitment plan for underrepresented groups to serve as reviewers on panels. Reviewers from HBCUs and MSIs are not always effectively represented on panels.

- DR K-12 should raise the expected percentage of participation of individuals from underrepresented groups. Additionally, the COV encourages increased support/encouragement for applicants in rural communities.
- DR K-12 should develop an explicit recruitment plan for individuals from underrepresented groups to serve as reviewers on panels.
- DR K-12 should develop an explicit recruitment plan for reviewers from HBCUs and MSIs to serve on panels.

Program Response (January 2014): DRL's goal is at least 20% minority representation on panels. Because fewer than half of the reviewers provide their demographic information (doing so is voluntary), the extent to which we can intentionally shape the composition of panels is

limited. Program staff and the division's leadership continue to look for ways to include more minority and rural reviewers. The DRK-12 program will contribute to the development of a specific recruitment plan for DRL as a whole.

COV Recommendation: The COV noted that some areas of PO expertise may be missing from the program. Specifically, expertise in mathematics content and science education were not readily apparent in the range of current POs. Recruitment efforts may need to focus on particular backgrounds/expertise.

Program Response (January 2014): Since the COV, three program officers with expertise in mathematics or mathematics education have been hired. Four program officers in DRL have doctorates in science education, and three have doctorates in the disciplinary sciences.

COV Recommendation: The 2010 projection for the number of proposals was only 2/3 of the total number submitted the previous year. More realistic projections could reduce stress on program staff by giving them accurate targets for the number and expertise of reviewers needed to complete proposal reviews.

Program Response (January 2014): As the program has matured, we have been able to make more accurate estimates of proposal submissions. However, fluctuations (both positive and negative) still occur, and it is not possible to predict those.

COV Recommendations: The COV did not see much evidence that findings from DRK-12 projects are broadly disseminated.

- The COV suggests that the program promote best practices in dissemination not only within the research community, but also within communities of practice to increase broader impacts.
- The COV also suggests that data be provided to future COVs documenting how projects disseminate their lessons learned.

Program Response (January 2014): The new DRK-12 solicitation (NSF 13-601) incorporates division-wide requirements for dissemination. Specifically: "A proposal must include a creative communication strategy for reaching a broad audience for the findings of the project, including, where appropriate, scholars, practitioners, policymakers and public audiences. While the potential results of the proposed research are expected to be of sufficient significance to merit peer-reviewed and broader publication, approaches that reach broader audiences are strongly encouraged. Proposals should identify the key elements of a communication plan, e.g., target audiences and identification of the channels/media/technologies appropriate for reaching specific audiences."

It is the responsibility of individual projects to report their dissemination efforts, and the structure of the new Research Performance Progress Report (RPPR) in Research.gov requires more specific reporting of the publications and presentations from projects. As the COV saw, the

CADRE project (the resource network that supports researchers and developers who participate in DRK-12 projects) has made explicit the dissemination of project findings on its website. In addition, during the past few years, the DRK-12 program has supported meetings based on the STEM Schools project, which has emphasized the dissemination of findings from DRK-12 projects.

COV Recommendation: The COV encourages NSF to seek ways to document the value that PI meetings may add to the program for building a community of practice and to consider other opportunities for having members of the community share their views and expertise.

Program Response (January 2014): The program recognizes the value of PI meetings. However, given current budgetary constraints and Government-wide management directives, conferences of any type are difficult to justify. During the past few years, DRK-12 has supported meetings based on the STEM Schools project.

COV Recommendation: Though NSF has promoted the DRK-12 Program among teacher education programs, the COV noted the relative lack of funded pre-service teacher projects as an ongoing issue. The COV encourages DRK-12 to continue considering innovative ways they might encourage teacher-preparation and teacher-support programs to develop and submit proposals that will support new teachers as they transition from pre-service through their early careers.

Program Response (January 2014): The DRK-12 solicitation explicitly encourages research and development focusing on both preservice and inservice teachers. However, other NSF programs—in particular, the Robert Noyce Teacher Scholarship program and the MSP (now STEM-C Partnership) program—provide significant funding for preservice teacher projects.

COV Recommendations: The COV recommends articulating, and providing to future COVs, a more explicit statement about the desired portfolio balance along multiple dimensions. At the same time, a more explicit definition of what constitutes the "DRK-12 portfolio" would be helpful, resolving ambiguities such as whether to include awards that came in response to other solicitations.... The COV recommends more attention to compiling consistent and well-documented data on the portfolio for future COVs and in support of management's decision-making.

Program Response (January 2014): At both the directorate and division levels in EHR, efforts are underway to better articulate the scope of the various program portfolios. Although the new DRK-12 solicitation (NSF 13-601) is somewhat more specific about priorities and methods than earlier solicitations, DRK-12 remains a field-driven program, and it is therefore not possible to lay out expectations for the award portfolio in great detail in advance of the proposals. We can, however, do a better job describing the balance of the portfolio at points in time. The analysis of the DRK-12 portfolio will separate proposals submitted to the DRK-12 solicitation from proposals submitted to other solicitations/announcements (but funded by DRK-12). It should be

noted that most of those "non-DRK-12" proposals are submitted through the CAREER, EAGER, and RAPID mechanisms and are reviewed under the DRK-12 guidelines. In addition, DRK-12 is an active participant in cross-directorate activities such as Cyberlearning: Transforming Education (CTE), to which the directorate has committed DRK-12 funds. These activities add important dimensions to the DRK-12 program's portfolio.

COV Recommendation: The COV recommends that DRL staff set goals for the combined DRK-12 and REESE portfolio so as to ensure adequate attention to all parts of the "Cycle of Research and Development." Special attention should be given to encouraging proposals that fit the "Implement" and "Scale Up" stages.

Program Response (January 2014): The language in new DRL solicitations has changed from the "Cycle of Research and Development" to the framework for R&D described in the *Common Guidelines for Education Research and Development* (developed by the Department of Education's Institute of Education Sciences and NSF). In view of NSF's mission, most of our R&D efforts will focus on the earlier stage. However, we have included a revised focus on implementation research in the new DRK-12 solicitation (NSF 13-601).

COV Recommendation: The panel recognizes the tension between bringing in new PIs and tapping into the experience of prior awardees, and is concerned that the percentage of new PIs may be, in fact, too high, especially in large grants. The COV recommends that the program be careful that strong proposals by PIs and co-PIs with strong track records continue to be funded.

Program Response (January 2014): We believe that the balance of new PIs and previously funded PIs in the current award portfolio is appropriate and reflects the quality of the work proposed. However, we will remain attentive to this issue as we periodically reexamine the many dimensions of the award portfolio.

COV Recommendation: The COV recommends that the program encourage more proposals targeting special education students, ELL students, and students in low-performing schools, as well as the teachers of these groups of students, with the goal of funding more projects with these populations as a focus.

Program Response (January 2014): We agree that these are important populations. The REAL program has explicitly called for research in these areas as part of the focus on the cross-EHR theme of broadening participation. The new DRK-12 solicitation (NSF 13-601) clearly addresses these populations as important for research and development in the program.

COV Recommendation: The COV could not determine whether sufficient attention is being paid to research methodologies that have the potential to reveal the processes and mechanisms that contribute to student learning, in contrast with gross comparisons of efficacy across treatments. The COV recommends that NSF compile information about portfolio balance with respect to

research methods aimed at elucidating educational processes that contribute to efficacy. Projects that employ such methods should be encouraged.

Program Response (January 2014): We agree and are performing this analysis now that the *Common Guidelines* have been published.

COV Recommendation: Since the last COV report, efforts by NSF staff have contributed to an increase in the number of proposals from states that were identified as underrepresented in NSF's analysis of geographic diversity. However, there remain a large number of states, which together represent a substantial population and that contain many outstanding universities, where there are very few funded DRK-12 proposals. These include a very large number of EPSCoR states and a very large number of rural states. The COV believes this is unacceptable. NSF should consider providing additional support/capacity building/technical assistance to these states to further stimulate competitive proposals from these states.

Program Response (January 2014): We continue to recognize that relatively few DRK-12 awards have gone to institutions in rural areas. We will continue outreach to these states to the extent that our limited travel funds permit.

COV Recommendation: The COV found a near absence of DR K12 proposals with a focus on rural education. DRK-12 should consider a research focus on STEM education in rural communities. In addition to making important contributions to enhancing math and science K-12 education in rural areas, a possible secondary benefit is that such an emphasis may encourage additional proposals from rural states including the 31 states that are most underrepresented in the DRK-12 portfolio.

Program Response (January 2014): We recognize that rural districts have specific needs related to STEM teaching and learning. As program officers examine highly competitive proposals for funding, they consider a range of portfolio issues, including the geographic distribution of awards. Competitive proposals from EPSCoR states, which are primarily rural, are given special attention. We believe that a specific focus on research and development in rural communities would not be consistent with the program's emphasis on the development of resources, models, and tools that have broad applicability.

COV Recommendation: The COV sees a need for the DRK-12 Program to ensure quality and adequacy of professional development opportunities, for projects to use measures of teacher knowledge (such as the NSF-funded Knowledge of Mathematics for Teaching assessments) that permit comparison of gains in teacher knowledge across grants, and for research projects that help the field understand the amount and quality of professional development required to make significant improvements in teacher knowledge.

Program Response (January 2014): We do not believe that it is appropriate for NSF program officers to prescribe a specific assessment or outcome measure across the variety of projects in

the program. However, during the review and negotiation of prospective awards with PIs, we will continue to emphasize the need to use reliable and valid measures. In addition, the CADRE project has produced a review of the use of instruments with known technical quality, and program officers will continue to direct prospective PIs to this report.

COV Recommendation: DRK-12 should support efforts to investigate and develop new research methodologies that are appropriate for addressing the more complex research questions arising from the educational community. Specifically, methods that provide an understanding of contexts and lead to causal inferences which help to understand how contextual factors impact outcomes of the research should be encouraged.

Program Response (January 2014): Although it is important to develop new research methodologies, this is a focus of three other, related programs: PRIME, REAL, and EHR Core Research (ECR). However, we have revised the Scale-up strand within DRK-12 to encourage more focus on implementation research.

COV Recommendations: The COV suggests more exploratory awards, a longer duration for awards (5 years), and more synthesis awards.

Program Response (January 2014): We recognize the need to support exploratory research and development, and we agree that there should be more such awards. To maximize those types of awards, program officers will pay particular attention to the issue during their discussions of highly competitive proposals. However, we disagree with a longer duration for projects. While there are benefits, longer durations for individual awards would reduce the overall number of awards unless the yearly award budgets were also reduced or the program's budget was increased. More importantly, we believe that the shorter duration of four years encourages quicker reporting of findings to make RMTs available to schools. The new DRK-12 solicitation (NSF 13-601) includes a specific call for synthesis proposals.

COV Recommendations: For future COVs:

- Provide more disaggregated data about reviewers.
- Provide more information about the review process related to proposals. How are decisions made to pursue certain types of projects over others, etc.?
- Any cross-cutting questions or key questions of importance should be provided to the COV explicitly at the beginning of the report [template].
- The COV felt two sections of the COV Report Template did not provide explicit directions or enough guidance: Section III - Management, Question 2 and the over-arching prompt in Section IV.

Program Response (January 2014): For the next COV, the program will provide additional views of the available reviewer data and additional information about how program officers shape the award portfolio. Our ability to modify the COV report template, which is an NSF-wide document designed to serve all programs, is limited; but we will try to provide more time for the

next COV to examine the questions in advance and to discuss with NSF staff the possible interpretation of particular questions as applied to the program.