

Staff Response to the Committee of Visitors (COV) Report Research on Learning and Education (ROLE)

COV Meeting Date: May 26-27, 2005

The purpose of this memorandum is to respond to the Committee of Visitors (COV) report submitted to the EHR Advisory Committee by COV committee chairperson Dr. Susan Borque. The COV covered the Research on Learning and Education (ROLE) program from 2002-2004. The COV's review process was guided by the requirements of the Government Performance and Results Act (GPRA) and by several questions generated by the Division of Research, Evaluation, and Communication.

Overall, the COV findings were positive, as summarized in this statement: "The COV applauds what ROLE has accomplished in the short period of time it has been in existence. To date, ROLE has an impressive portfolio of funded projects. The COV salutes the program for funding a group of excellent and diverse researchers at various stages in their careers. In addition, ROLE does a good job of seeking out and forming partnerships with other groups within NSF."

However, the COV also made a number of recommendations for improvements to the program, recommendations which the ROLE staff addresses below. For the sake of brevity, we refrain from responding to the affirmative comments, though we appreciate them. In addition, we have tried to respond to each recommendation, some of which were made multiple times, only once; in our response we have indicated all sections in the report where a specific recommendation can be found. Our response generally follows the outline of the COV report, with pertinent sections identified, COV comments presented in regular type, and ROLE responses indicated in italics.

The ROLE staff wishes to thank the COV for their hard work and careful analysis of the program. Their suggestions are extremely helpful at a time of transition in the program and will be carefully considered as the program moves forward.

EXECUTIVE SUMMARY (See also sections A.4.11, A.5.2, A.5.3, C.1, and C.3)

COV Comments:

In summary, the COV recognizes that ROLE has accomplished much in a short period. However, **now is the time for ROLE to focus strategically**. ROLE needs to initiate and sustain both external and internal conversations to discuss its mission, goals and strategies. Toward this end, ROLE might begin by convening an advisory panel of external experts to discuss where ROLE should target its efforts. ROLE staff should also initiate a series of internal conversations in which they seek to clarify, focus, and narrow the mission of ROLE. **They also need to develop strategies for integrating the findings from the program's funded research and for effectively communicating and disseminating these results to audiences where they will have the greatest impact.** ROLE has an important story to tell—we urge you to tell it as broadly as possible both in NSF and in the scientific community.

ROLE Response:

The two major recommendations running throughout the COV report are 1) the need for more focus in the ROLE program and 2) the need to better communicate the findings generated through ROLE-sponsored research to multiple stakeholder audiences.

More Focus: *The ROLE staff agrees that the ROLE program became extremely broad when several existing programs on educational technology, teaching and learning, and policy studies were first merged into one program in 1997 that attracted researchers representing a wide range of disciplines. In 1999, ROLE extended the reach of previous programs by focusing on linkages between basic sciences of brain development and learning of S&E areas. At that time there was little funding available outside of ROLE for education research. However, in recent years some programs in EHR and the other research directorates have implemented new programs, which to some extent duplicate our efforts. For example, the Science of Learning Centers program specifically supports some of the work envisioned in (and originally funded through) ROLE. Within EHR, the Teacher Professional Continuum and the Math Science Partnership's RETA program support research on the relationships among teacher learning, classroom curriculum coverage, and student learning. These are areas of study that were and are also supported by ROLE's emphasis on research on science and engineering education. Another new program, Advanced Learning Technology, funds work in computer science and cognition that also has been supported by ROLE's emphasis on fundamental research on learning.*

In addition, EHR as a whole began the process of re-conceptualizing the role of research in all of its divisions and programs over a year ago. The AD created an Internal Resource Group (IRG) of program officers that meets regularly to discuss how to establish a scientific research basis for EHR programs and policies. In a series of lectures, outside researchers were invited to address NSF staff about the nature of education research and the status of knowledge about learning, and teaching in a variety of S&E disciplines. Another series of workshops was held recently on the topic of Cyberlearning and sought to identify the emerging issues in technology and learning that could substantially enhance S&E education. A report with recommendations for NSF for a more focused technology and education initiative was prepared following these workshops. Thus, because the interest in and funding for education research has increased across EHR and the Foundation over the past few years, ROLE agrees with the COV that it is time to focus our efforts and more clearly define our strategic niche.

In light of the broader interest in education research across EHR and the Foundation, ROLE agrees with the COV that outside experts should be included in the process of helping ROLE to redefine its strategic research niche. That process was begun in late 2003 when the REC Division held three workshops on research, evaluation and communication. Experts from the field were invited to both comment on the work of REC and to suggest changes and redirections. Three proposed future activities are:

- *The annual Principal Investigator meeting in December 2005 will focus on the future strategic direction of the ROLE program in EHR. In addition to the 200 or so ROLE Principal Investigators, other researchers will be invited to the meeting to engage in the discussion.*
- *ROLE will use some of its limited FY 2006 funds to solicit synthesis studies of major findings in education research and to identify those areas where future research might have the greatest potential for impact. In addition, small workshops that synthesize findings will be supported. ROLE staff will also continue to write synthesis reports for presentations at professional meetings.*
- *EHR is writing a mission statement that continues to sharpen the focus on education research and its central position in EHR.*

It would be premature at this point to state what the focus of the new research program will be. There are, however, some general principles that REC will use in making these decisions:

- *A strong emphasis on research that will support the development of advanced S&E literacy for all students.*
- *Primary focus on basic and theoretical work in education research that focuses on learning S&E content.*
- *Elimination of unnecessary duplication with other, more applied, research programs such as TPC.*
- *Opportunities for close ties with the Research and Related programs at NSF.*
- *Emphasis on rigorous methodology whether that methodology is qualitative or quantitative.*

Better Communication: *In addition to refocusing its mission, ROLE intends to continue to pursue improved avenues for communicating the results of research it funds. At AERA, the American Evaluation Association and at other meetings, ROLE staff members have presented papers that synthesized the research program to audiences in education research. ROLE staff will continue with these activities and implement new ones to ensure greater communication of findings to more stakeholder audiences.*

- *ROLE staff will continue to contribute to the intellectual development of the field of education research. For example, staff members have submitted proposals to AERA and AEA again this year.*
- *In FY 2006, ROLE will make a major commitment to conduct site visits. Among other foci, these visits will seek to determine which projects might be good candidates for broader dissemination of findings.*
- *Along with others in EHR, ROLE is participating in the development of knowledge management activities that will allow EHR to have a better grasp of what the contributions of EHR work have been to theory and practice.*
- *The Directorate is discussing the possibility of hiring a person who can help EHR better communicate with its stakeholder audiences including policymakers and practitioners.*

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

Part A.1. Integrity and efficiency of the program's use of merit review procedures.

Question A. 1.1. Is the review mechanism appropriate?

COV Comments:

There was some unevenness in the sample of individual reviews examined by the COV. Members of the COV stressed the need for preparation of reviewers and wondered if the ROLE leadership would want to establish online training for first time reviewers that would include expectations and models of good reviews. The COV suggests that ROLE continue to explore this.

ROLE agrees that more pre-review guidance would be helpful. ROLE did get permission to post proposals and reviews on its web site. We will update this information. The site will also have examples of strong reviews. These can be sent to reviewers along with the review instructions.

ROLE will also work with other divisions to develop a more comprehensive “guide for reviewers.” This could include, in addition to instructions for using the Fastlane systems, examples of appropriate reviews, the NSB approved examples of broad impact and other guidance. ROLE will consider placing this guide on the web.

With the new Fastlane review system, programs receive email copies of reviews. Where these are submitted in sufficient time, program officers can suggest that some reviews might need strengthening. ROLE also includes reviewers with a broad range of expertise. An individual reviewer might not, therefore, have the particular expertise to identify subtle strengths and weaknesses.

Question A.1.4. Do the individual reviews provide sufficient information for the principal investigator(s) to understand the basis for the reviewer’s recommendation?

COV Comments:

Our experience with the sample we reviewed indicates that individual reviews were uneven. In some cases they were very detailed and helpful, and in other cases they were cursory and less helpful.

As discussed above, ROLE is working on ways to better train reviewers

Question A.1.8. Discuss any issues identified by the COV concerning the quality and effectiveness of the program’s use of merit review procedures:

COV Comments:

See item 1. Several copies of excellent and inadequate reviews should be provided to potential reviewers as guidelines. The COV endorsed continuing the practice of combining new and experienced ROLE reviewers on each panel.

While the majority of the COV favors the current practice of utilizing rotating membership on review panels, we concluded that there would be value in providing panel members with more guidance about the type of review that is most helpful.

ROLE will develop clearer guidelines for reviewers, continue to combine new and experienced reviewers on its panel, and consider other review panel options.

A.2. Questions concerning the implementation of the NSF Merit Review Criteria (intellectual merit and broader impacts) by reviewers and program officers.

Question A.2.4. Discuss any issues the COV has identified with respect to implementation of NSF’s merit review criteria.

COV Comments:

See 3 above. Both PI’s and reviewers tend to address both criteria although discussions of broader impact pose considerable challenges for some PI’s.

The COV suggests that ROLE devote more attention to describing the broader impacts it seeks. It could then use these descriptions to guide PI's and reviewers. This additional attention to broader impacts by ROLE might also help address questions raised below about the focus of the program.

The NSF website for reviewing proposals provides ample examples of the concerns that should be addressed in the broader impact criterion. However, ROLE staff will pay more attention to providing examples in the orientation of panels and during the panel process. We will also send additional material with examples of good reviews to panelists before they meet.

A.4 Questions concerning the resulting portfolio of awards under review.

Question A.4.1. Overall quality of the research and/or education projects supported by the program.

COV Comments:

Projects were often funded even after reviewers raised serious questions about the conceptualization, the design, and/or the methods of analysis. Based on the sample of funded projects that the COV reviewed, the COV concluded that ROLE seems to fund a range of projects of mixed quality on a wide variety of topics. The COV did see a substantial difference in quality between the funded projects and those that were declined. The funded projects were clearly higher in quality.

The COV raised questions about the relationship of workshops and conferences to the research portfolio. In addition the COV wondered about the value and cost of some of these meetings.

Occasionally program directors choose to fund a project that is of high risk that has potential to add value to the portfolio. In some cases, the design might not have been adequately explained and the program officer seeks additional information during negotiations. In other cases, program officers might negotiate to add additional expertise to the project.

ROLE does, however, recognize that the methodological rigor of some of its earlier funded work might not have been as strong as in later work. In the past three years ROLE has made a strategic effort to ensure that reviewers with strong methodological expertise serve on all panels.

Workshops and conferences are one way that the ROLE investigators have to communicate their results to other audiences. The program officers will support only those projects that have a high potential to improve the entire portfolio of research studies or which deal with cutting-edge questions.

Question A.4.14. Discuss any concerns relevant to the quality of the projects or the balance of the portfolio.

COV Comments:

The scope of the funded research may be too broad. By focusing on such a wide variety of projects, ranging from f-mri studies of mathematical reasoning to administrative management of schools, the program may lose a center of gravity. This in turn translates into difficulties in explaining the core mission of the program and in making clear to the broader public the ways in which the funded research is helping advance science and mathematics literacy and career development in STEM areas.

The COV suggests a more targeted focus that could be more easily communicated both to PI's and to the public.

At the same time the COV sees a clear need for funding research on learning and education within ROLE and NSF. There are considerable benefits to supporting research on the learning of science and mathematics within an organization that also advances fundamental knowledge in these disciplines. In addition, much of the research on learning and education is conducted using an array of scientific methods that conforms well with the mission of NSF.

It is important that the portfolio include research on STEM learning in community colleges where large numbers of our future teachers receive their only instruction in mathematics and science.

ROLE is to be congratulated for embracing both quantitative and qualitative research that is of high quality in almost all cases. It is important to recognize that multiple rigorous methods are necessary to yield results that can inform practice. Multiple methodologies should continue to be recognized by ROLE.

ROLE is currently in the process of reviewing its mission and rewriting its solicitation. We agree that our scope in the past may have been too broad, but we are also cognizant that we are the only education research program at NSF that funds rigorous research studies of learning from K-22 using a variety of methods. We must therefore be very deliberative in thinking about how best to focus the program. The future program is likely to focus uniquely on learning in the science and engineering disciplines at all levels and to study those factors that could affect learning of those disciplines.

PART C. OTHER TOPICS

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

COV Comments:

ROLE has funded innovative research in a variety of fields and disciplines; however, it does not appear that research outcomes are shared widely across the Foundation. For example, ROLE's leadership within EHR on research on learning and education has served as an incubator for ideas and streams of work that led to the Science of Learning Centers. Yet the COV found no evidence that research results from ROLE projects have been systematically shared with these Centers or with the Centers for Teaching and Learning. While individual program officers interact with colleagues from other directorates, it is only by chance that what is known about learning gets incorporated into the programs of these directorates. It is also not clear that NSF has a mechanism for wide dissemination of instructional materials, ideas and tools that work. The COV believes that if NSF (and the education community) clearly knew the projects funded by ROLE and their implications, the total impact of NSF funding would be greater.

ROLE and EHR must lead conversations within the scientific community and the broader U.S. public about the importance of national science and mathematics literacy. The NSF directorates need better and more easily used information from EHR and ROLE about what works in mathematics and science classrooms.

ROLE and EHR have clearly heard this suggestion and had begun systemizing it before receiving the COV report. Examples include: joint committees on education research and evaluation with MPS; systematic collaboration with GEO on a new education solicitation; key involvement with OPP on the planning for the International Polar Year for which NSF is the lead US agency, etc.

We are also focusing on finding better ways to 1) accumulate the knowledge that has been generated by NSF (and other) funding about learning and 2) disseminate it to various audiences in appropriate formats.

We are also collaborating with other federal agencies, especially the US Department of Education on, for example, identifying effective materials for teachers for the new mathematics thrust for Title I.

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

COV Comments:

The prior COV review requested a synthesis of findings from ROLE and related research. Such a synthesis would give this research greater impact. We did not find evidence that this synthesis had been undertaken and we again urge ROLE to do so.

See the COV 2002 report.

This effort is a current priority for ROLE and will be the main focus of the 2006 ROLE solicitation.