

MEMORANDUM

DATE: December 15, 2005
TO: Bernice Anderson, Senior Advisor on Evaluation
 Directorate for Education and Human Resources
FROM:
SUBJECT: COV for GK-12
 COI and Diversity Memo

The Committee of Visitors report for the GK-12 Program was approved at the EHR Advisory Committee meeting held at NSF on November 2, 2005. The COV consisted of 6 members selected for their expertise related to the goals of the program. They provided a balance with respect to the type of institutions supported through the program, gender, and representation from underrepresented groups. The following table shows the main features of the COV's diversity.

Category of COV Membership	No. of COV Members in Category
Member of EHR Advisory Committee.....6....
Institution Type: <input type="checkbox"/> University..... <input type="checkbox"/> Four-year College..... <input type="checkbox"/> Two-year College..... <input type="checkbox"/> K-12 School or LEA..... <input type="checkbox"/> Industry..... <input type="checkbox"/> Federal Agency..... <input type="checkbox"/> Non Profit Organization5.....1.....
Location <input type="checkbox"/> East..... <input type="checkbox"/> Midwest/North <input type="checkbox"/> West..... <input type="checkbox"/> South.....1.....2...1.....2...
Gender <input type="checkbox"/> Female..... <input type="checkbox"/> Male.....3.....3.....
Race/Ethnicity <input type="checkbox"/> White..... <input type="checkbox"/> Black..... <input type="checkbox"/> Hispanic..... <input type="checkbox"/> Asian..... <input type="checkbox"/> Pacific Islander.....3.....1...1.....1.....

The COV was briefed on Conflict of Interest issues and each COV member completed a COI form. COV members had no conflicts with any of the proposals or files. (or, if they did, use 'Proposals and files were not available to COV members in those cases where the member had a COI and members were not allowed to participate in discussions of actions with which they had conflicts.')

CORE QUESTIONS and REPORT TEMPLATE
for
FY 2005 NSF COMMITTEE OF VISITOR (COV) REVIEWS

Guidance to NSF Staff: This document includes the FY 2005 set of Core Questions and the COV Report Template for use by NSF staff when preparing and conducting COVs during FY 2005. Specific guidance for NSF staff describing the COV review process is described in Subchapter 300-Committee of Visitors Reviews (NSF Manual 1, Section VIII) that can be obtained at <http://www.inside.nsf.gov/od/gpra/>.

NSF relies on the judgment of external experts to maintain high standards of program management, to provide advice for continuous improvement of NSF performance, and to ensure openness to the research and education community served by the Foundation. Committee of Visitor (COV) reviews provide NSF with external expert judgments in two areas: (1) assessments of the quality and integrity of program operations and program-level technical and managerial matters pertaining to proposal decisions; and (2) comments on how the results generated by awardees have contributed to the attainment of NSF's mission and strategic outcome goals.

Many of the Core Questions are derived from NSF performance goals and apply to the portfolio of activities represented in the program(s) under review. The program(s) under review may include several subactivities 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 subactivities 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.

Guidance to the COV: The COV report should provide a balanced assessment of NSF's performance in two primary areas: (A) the integrity and efficiency of the **processes** related to proposal review; and (B) the quality of the **results** of NSF's investments that appear over time. The COV also explores the relationships between award decisions and program/NSF-wide goals in order to determine the likelihood that the portfolio will lead to the desired results in the future. Discussions leading to answers for Part A of the Core Questions will require study of confidential material such as declined proposals and reviewer comments. *COV reports should not contain confidential material or specific information about declined proposals.* Discussions leading to answers for Part B of the Core Questions will involve study of non-confidential material such as results of NSF-funded projects. It is important to recognize that the reports generated by COVs are used in assessing agency progress in order to meet government-wide performance reporting requirements, and are made available to the public. Since material from COV reports is used in NSF performance reports, the COV report may be subject to an audit.

We encourage COV members to provide comments to NSF on how to improve in all areas, as well as suggestions for the COV process, format, and questions.

**FY 2005 REPORT TEMPLATE FOR
NSF COMMITTEES OF VISITORS (COVs)**

Date of COV	<i>April 4 -5, 2005</i>		
Program/Cluster:	<i>Graduate Teaching Fellows in K-12 Education (GK-12)</i>		
Division:	<i>Graduate Education</i>		
Directorate:	<i>Education and Human Resources</i>		
Number of actions reviewed by COV¹:	Awards:	95?	Declinations: 45 Other:
Total number of actions within Program/Cluster/Division during period being reviewed by COV²:	339	Awards: 95	Declinations: 242 Other: 2
Manner in which reviewed actions were selected:	All awards and every 5th declination for each year were available to the COV		

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

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

A.1 Questions about the quality and effectiveness of the program's use of merit review procedures. Provide comments in the space below the question. Discuss areas of concern in the space provided.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE³
<p>1. Is the review mechanism appropriate? (panels, ad hoc reviews, site visits)</p> <p>Comments: <i>- Panelists reviewed proposals and sent reviews via FastLane prior to coming to panel meeting. This process seems thorough.</i> <i>- Site visits to institutions prior to award to obtain firsthand information are critical for overall evaluations and program implementation. These visits are central for the program officers to assess fully graduate fellow outcomes and institutional culture and climate.</i></p>	YES

¹ To be provided by NSF staff.

² To be provided by NSF staff.

³ If "Not Applicable" please explain why in the "Comments" section.

<p>- <i>The notes on the site visit for Proposal #0440506 to St. Joseph's University in the University-Museum-Elementary school collaboration is an example of the firsthand observations made during the site visit that would have been impossible to convey in written reports.</i></p> <p>- <i>Site visits have not been possible lately due to financial constraints.</i></p>	
<p>2. Is the review process efficient and effective? <i>Attempts are made to have each proposal reviewed by at least 5 panelists, with disciplinary sub-panels. Situations where 5 panelists are not on a panel, for instance where conflicts of interest existed, had at least four panelists. Two NSF program officers who are members of the GK-12 Committee are present in each sub-panel. Panelists sort proposal into three categories: "Fund", "Fund if available", and "Do not fund".</i></p> <p>Comments:- - <i>Panels are convened and reviews have been completed efficiently and made available to principal investigators via Fastlane with sufficient turnaround time.</i> - <i>Feedback, questions, and points for clarification from reviews are conveyed efficiently to principal investigators and back to program officers for final disposition of the project.</i> - <i>In this particular program, intellectual merit seems less well addressed in terms of content, although its main focus is generally in creating a broader impact in mathematics and science education.</i></p>	YES
<p>3. Are reviews consistent with priorities and criteria stated in the program's solicitations, announcements, and guidelines?</p> <p>Comments: - <i>In some cases, the Track II review criteria are not adequately addressed by reviewers. The 2004 reviews appeared to be better in this respect than previous years.</i> - <i>There needs to be more consistency in addressing of intellectual merit and broader impacts by individual reviewers as well as in review analysis (Form 7). We noted that individual criteria are not addressed in some form 7s.</i></p>	YES
<p>4. Do the individual reviews (either mail or panel) provide sufficient information for the principal investigator(s) to understand the basis for the reviewer's recommendation?</p> <p>Comments: - <i>Overall, the individual reviews provide useful information over the totality of proposals and the documentation is very good in general. There are a few instances where information supplied by the reviewers to principal investigators are expanded on by program officers. These extra efforts on the part of the program officers are essential to a vibrant program.</i></p>	YES
<p>5. Do the panel summaries provide sufficient information for the principal investigator(s) to understand the basis for the panel recommendation?</p> <p>Comments: - <i>In all the jackets reviewed, the letters from program officers elaborated the basis of panel recommendations clearly and in a useful fashion.</i></p>	YES

<p>6. Is the documentation for recommendations complete, and does the program officer provide sufficient information and justification for her/his recommendation?</p> <p>Comments: - <i>Although complete for the most part, even in the 2004 documentation, there are still some reviews where the review analysis and proposal review summary have not adequately addressed the merit review criteria .</i></p>	<p>YES (please see comments)</p>
<p>7. Is the time to decision appropriate? % of proposals processed within 6 months of receipt: 2004: 85% 2003: 86% 2002: 99% (Need to check number of proposals received each year)</p> <p><i>These data show that the program has continuously exceeded the GPRA goal of 70% of proposals processed within 6 months.</i></p> <p>Comments: <i>The COV is concerned about the current trend in time to decision (times seem to be getting longer). Some delay is understandable given the extent of negotiation and the cross-directorate funding. Program management should comment on possible reasons for this trend. Given the lifetime of the program, are there issues relative to the number of projects that are currently being managed and the number of projects that come on line each year that may affect this trend? Was the number of proposals significantly lower in 2002?</i></p>	<p>YES (See comments)</p>
<p>8. Discuss any issues identified by the COV concerning the quality and effectiveness of the program's use of merit review procedures:</p> <p><u>1. Definition of merit review criteria should be improved</u> - <i>GK-12 is a very special concept with the focus on 4 goals:</i> a. <i>The Graduate student's development: Goal 1:</i> <i>"Improved communication and instructional skills for Fellows;"</i> b. <i>The gains in the K-12 system : Goals 2 and 3:</i> <i>"Increased professional development opportunities and content gains for K-12;"</i> <i>"Enriched student learning"</i> c. <i>Building and sustaining partnerships: Goal 4</i> <i>"Strengthened partnerships between institutions of higher education and local school districts."</i></p> <p><i>The merit review criteria should be defined more clearly in the context of this program. Management should strive to provide better direction on what constitutes intellectual merit vs. broader impact for this program to aid in program development and assessment.</i></p> <p><u>2. The potential intellectual merit of this program is not fully realized in the current articulation of the review criteria</u> <i>The program description should explain clearly how the projects in this program can provide the emerging young scientists with the language to understand, conceive and teach our disciplines in a fundamental way and communicate scientific concepts clearly. This is needed to get the program accepted as an intellectual effort by colleagues in research disciplines. This is not embedded in the project.</i></p>	

--The language of science and inquiry should be used to describe what the graduate students gain from this project. It is more than "communication skills". For example, there could be a component of research in learning as a part of the graduate student work. This could constitute a portion of the intellectual merit criterion.

-Conceptualization of merit review criteria needs considerably more detailed reflection and articulation. Following that, the Program staff needs to provide better guidance on intellectual merit and broader impact for this particular program. This was also commented on by the 2002 COV.

- Track II criteria (documentation of quantitative outcomes such as longitudinal data, numbers impacted) need to be more adequately addressed. Track II applicants should be required to address criteria in a more specific fashion than is currently done, providing numbers and specific data to measure impact. The COV noticed that some of the proposals provide data on number of students impacted, but some do not.

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

Provide comments in the space below the question. Discuss issues or concerns in the space provided.

IMPLEMENTATION OF NSF MERIT REVIEW CRITERIA					YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE⁴																				
<p>1. Have the individual reviews (either mail or panel) addressed both merit review criteria? Data :</p> <table border="1"> <thead> <tr> <th>FY</th> <th>% of Reviews addressing both Review criteria</th> <th>Reviews Addressing Review criteria</th> <th>Reviews not Addressing Criteria</th> <th>Reviews Without Criteria</th> </tr> </thead> <tbody> <tr> <td>2004</td> <td>97%</td> <td>511</td> <td>529</td> <td>15</td> </tr> <tr> <td>2003</td> <td>92%</td> <td>454</td> <td>495</td> <td>20</td> </tr> <tr> <td>2002</td> <td>88%</td> <td>479</td> <td>547</td> <td>29</td> </tr> </tbody> </table> <p>Comments:-- 97% in 2004 is good.. right trend. There needs to be an effort to get 100% compliance with addressing of both review criteria</p>					FY	% of Reviews addressing both Review criteria	Reviews Addressing Review criteria	Reviews not Addressing Criteria	Reviews Without Criteria	2004	97%	511	529	15	2003	92%	454	495	20	2002	88%	479	547	29	YES
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2004	97%	511	529	15																					
2003	92%	454	495	20																					
2002	88%	479	547	29																					
<p>2. Have the panel summaries addressed both merit review criteria? Comments: <i>While most of the summaries address both review criteria, there are inconsistencies and a lack of consistent and complete addressing of the criteria even in some of the 2004 summaries.</i></p>					YES																				
<p>3. Have the review analyses (Form 7s) addressed both merit review criteria? Comments: <i>There were a few instances when Form 7 did not address the two review criteria specifically, while others did this in an implicit way. It would be good to be clear and address the two distinctly.</i></p>					YES																				
<p>4. Discuss any issues the COV has identified with respect to implementation of NSF's merit review criteria. <i>A. Track II criteria not adequately addressed in some 2003 awards. While the issue was eventually resolved through extensive interaction between program officers and PI's, it would</i></p>																									

⁴ In "Not Applicable" please explain why in the "Comments" section.

be useful to address the criteria explicitly and systematically in the reviews.

B. Panel summaries do not fully address the merit review criteria specifically..

The COV is troubled by the lack of definition (or interpretation) of intellectual merit criteria for this program. Program officers and GK-12 program staff should engage the applicant community in a dialogue as to what would make for a broader more succinct interpretation of intellectual merit as it pertains to the GK-12 program

-- As mentioned in the previous section, a clear articulation of the way in which this project will have lasting consequences needs to be addressed in merit review criteria.

-- Until we clearly articulate and give scientists the language to understand the way in which this project can have lasting consequences in conceiving and teaching STEM disciplines in a fundamental way and communicate this clearly, we will not have our colleagues in research disciplines understand and accept its importance. This is not now embedded in the projects.

A.3 Questions concerning the selection of reviewers. Provide comments in the space below the question. Discuss areas of concern in the space provided.

SELECTION OF REVIEWERS	YES , NO, DATA NOT AVAILABLE, or NOT APPLICABLE ⁵
<p>1. Did the program make use of an adequate number of reviewers?</p> <p>Comments: <i>An attempt was made to have each proposal reviewed by at least five reviewers. In situations where five panelists are not on a panel, for instance where conflicts of interest existed, the proposals had at least four panelists. Two NSF program officers who are members of the GK-12 Committee are present in each sub-panel.</i></p>	YES
<p>2. Did the program make use of reviewers having appropriate expertise and/or qualifications?</p> <p>Comments: <ul style="list-style-type: none"> - Diverse review panels with a good distribution of expertise, - The program could be improved by expanding the concept of partnership to enhance the future sustainability of the program by including industry. Industry (e.g., Chemistry) is interested in PhDs who can communicate. - Increase the inclusion of social scientists among reviewers even when the proposed disciplines of the project do not include social science. This may lead to better assessment of the process of the proposed projects as well. </p>	YES
<p>3. Did the program make appropriate use of reviewers to reflect balance among characteristics such as geography, type of institution, and underrepresented groups?</p> <p>Comments: <i>Review panelists data provided show that there is good balance with respect to gender and ethnic diversity, geography and type of institution, except industry.</i></p>	YES
<p>4. Did the program recognize and resolve conflicts of interest when appropriate?</p> <p>Comments:</p>	YES
<p>4. Discuss any issues the COV has identified relevant to selection of reviewers. Continue to work on increasing the representation of social scientists</p> <p><i>- It is important to include reviewers from all sectors, including those outside the academy such as</i></p>	

⁵ If “Not Applicable” please explain why in the “Comments” section.

industry and NGO's and experts in education and workforce development. Include as well members from community colleges. Work with AACC and others to invite community college faculty to panels. Professional Associations such as AISES can also serve as a source of panel members. Broadening the panels also helps build new partnerships. (see next point)

- The program should consider broadening the pool of reviewers to include industrial representatives who are in education and training functions (also possible future sponsors), more community college faculty, and other possible constituencies. This could help build local partnerships that could be valuable in long-term sustainability of projects.

A.4 Questions concerning the resulting portfolio of awards under review. Provide comments in the space below the question. Discuss areas of concern in the space provided.

<p align="center">RESULTING PORTFOLIO OF AWARDS</p>	<p align="center">APPROPRIATE, NOT APPROPRIATE⁶, OR DATA NOT AVAILABLE</p>
<p>1. Overall quality of the research and/or education projects supported by the program.</p> <p>Comments:</p> <p>--Committed PIs and students make the project serve a real need.</p> <p>-- There should be more publications emerging from projects. Projects should be encouraged to explore pedagogical research. The number of publications could be used as one outcome measure and this could enhance the value of the program in the research directorates as these publications would contribute to the teaching and learning of the STEM disciplines.</p> <p>-- Some projects show significant outcomes: UWA project shows increase in test outcome data</p> <p>-- Several projects have teaching modules as products.</p> <p>-- Examples of High Quality Awards:</p> <p>NSF DGE-0338215---(PI : Raineri, U Illinois)—GK-12 EdGrid Project This project involving production of computer-based modules for K-12 won the Best Paper Award for the graduate students in a SITE (Society of Information Technology in Education).</p> <p>NSF DGE-0338261—(PI: Llewellyn—Georgia Tech—GK-12: STEP-Up!! Publications in Engineering Education Forums Two prior Fellows are now Assistant Professors in Academia Three hold research positions in Industry One is a High School math Teacher Fellows are now found in 11 departments in 4 Colleges 21 Fellows are African-American</p> <p>Georgia Tech administration has acknowledged the importance of this endeavor by establishing an Educational Partnership Award of \$7,500 awarded annually to a partnership consisting of a Georgia Tech faculty member, a Georgia Tech student, and a K-12 teacher. In 2004 the team that was recognized carried out their project at a 99% African American, low income urban high school. The GT K-12 Fellow will present this project as a paper at the ASEE national conference in June. This is exemplary!</p>	<p align="center">APPROPRIATE</p>

⁶ If “Not Appropriate” please explain why in the “Comments” section.

<p><i>Projects over range of topics in all STEM areas.</i></p>	
<p>2. Are awards appropriate in size and duration for the scope of the projects?</p> <p>Comments: -- <i>They are in the range of \$450-500 K per year.</i> -- <i>Future awards may fall short due to the increase in stipends combined with the lifting of the 8% ceiling for indirect costs.</i></p>	<p>APPROPRIATE</p>
<p>3. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • High risk projects? <p>Comments: <i>Meaning of “risk” here could be interpreted in different ways, as shown in examples below. The program description needs to be clear about classifying high-risk—define criteria—this is a program officer’s role. The review analysis may be the place to include this.</i></p> <p><i>Alternative perspectives on “risk”</i> - <i>Many projects are urban and involve students “at risk”.</i> -<i>In terms of measurable learning outcomes for K-12, many of the projects would be seen at high risk; in some instances, the 4-5 hours travel time puts graduate student at risk.</i> --<i>There is no project example that poses high risk in terms of new platforms for grad education, or new platforms for education.</i> -- <i>It might be appropriate to point project proposers toward avoiding high risk for grad students, encouraging them to design programmatic elements so we don’t put individual grad student’s graduate study at risk</i> e.g., <i>Use of distance education tools and innovative educational delivery platforms may pose less risk for graduate students. This also creates modalities for innovative educational design.</i> -- <i>Evaluating proposals on large involvement of “high risk” students in K-12 may undervalue rural projects.</i></p> <p>--<i>High risk project examples:</i> DGE- 0338216----Clarkson----PI: Susan Powers <i>Risk here is that the project is being carried out in an economically struggling area of northern New York. Project requires significant travel as well.</i></p> <p>#0231998—UCLA <i>High risk because of involvement of first year teachers with one veteran teacher. Institutionalization seems to be weak in this case.</i></p>	<p>APPROPRIATE</p>
<p>4. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Multidisciplinary projects? <p>Comments: <i>All except seven projects during this period are called multidisciplinary because they involve graduate students and teachers from several disciplines, but few are <u>interdisciplinary</u>. Interdisciplinary projects should be encouraged, perhaps by looking for synergy with programs such as IGERT. -</i> - <i>It might be useful to invite truly interdisciplinary projects by some explicit definitions in the Program description. More incentives for “interdisciplinary”</i></p>	<p>SEE COMMENTS</p>

<p><i>GK-12's should be considered.</i></p> <p><i>Examples of truly interdisciplinary projects:</i> NSF DGE- 0338340 <i>University of Utah: (need to get project number) Project WEST (Water, the Environment, Science, and Teaching) is a truly interdisciplinary project in weaving together important environmental concerns, across disciplinary boundaries..</i> NSF DGE- 0231573 Syracuse University <i>Also environmental science projects involving activities consistent with the New York State science standards and dealing with environmental/science issues as a way of learning basic biology, chemistry, physics, and earth sciences.</i> NSF DGE- 0231856 University of Florida. <i>Project on ecosystem health: SPICE (Science Partners in Inquiry-based Collaborative Education)</i></p>	
<p>5. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Innovative projects? <p>Comments: <i>-The very idea of graduate students from diverse disciplines interacting with a common goal is itself an institutional innovation in the culture of STEM.</i> <i>- It was not possible to determine in our investigation how innovative the individual programs are.</i></p>	<p>DATA NOT AVAILABLE</p>
<p>6. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Funding for centers, groups and awards to individuals? <p>Comments:</p>	<p>APPROPRIATE</p>
<p>7. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Awards to new investigators? <p>Comments:</p>	<p>APPROPRIATE</p>
<p>8. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Geographical distribution of Principal Investigators? <p>Comments:</p>	<p>APPROPRIATE</p>
<p>9. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Institutional types? <p>Comments: <i>-GK-12 awards are given to graduate degree- granting institutions (MS or PhD). They are not given to individuals or Centers. However, several projects are affiliated with centers, museums and other institutions.</i> <i>-- Participation of community colleges as partners of graduate degree-granting institutions in GK-12 projects should be explored.</i></p>	<p>APPROPRIATE Within program constraints</p>

<p>10. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Projects that integrate research and education? <p>Comments: -- Graduate students doing research separately from their GK-12 projects can not be considered as an integrative activity. -- GK-12 projects bring up a unique way of integrating research and education, by including pedagogical research in the agenda of mainstream research. This should be explored. Only a few projects do this, e.g., the project at Tufts (NSF DGE- 0230840) includes engineering education research.</p>	<p>APPROPRIATE (See notes)</p>
<p>11. Does the program portfolio have an appropriate balance:</p> <ul style="list-style-type: none"> • Across disciplines and subdisciplines of the activity and of emerging opportunities? <p>Comments: <i>Many of the projects are in traditional disciplines. There are several projects, however, that are in emerging areas such as ecosystem health (University of Florida). A unique project at the University of South Florida (NSF DGE- 0231843) has fellows engage disabled students in STEM learning by maximizing hands-on manipulative activities designed for multi-ability students.</i></p>	<p>APPROPRIATE</p>
<p>12. Does the program portfolio have appropriate participation of underrepresented groups?</p> <p>Comments: - Good involvement in urban schools, good number of minority teacher involvement. 76 of 95 projects are in an urban environment, so there is a very good participation of minorities in the K-12 system. --Diversity among fellows continues to be an issue. (AIR report, page 13 shows 83% white, 8% Hispanic) -- More efforts should be made to increase the number of underrepresented PI's and Fellows. The number of Latino Fellows for example is primarily a result of the awards that have been made to two universities in Puerto Rico. Similarly there is a pocket of a high number of African American Fellows in the Georgia Tech program. Overall, the Fellows diversity needs to improve, although this is probably symptomatic of the larger issue of the lack of diversity in research-intensive institutions</p>	<p>APPROPRIATE (see comments)</p>
<p>13. Is the program relevant to national priorities, agency mission, relevant fields and other customer needs? Include citations of relevant external reports.</p> <p>Comments: -- The program is a tremendous opportunity as a critical piece in addressing workforce and citizen technology education. Contributions to workforce – growing our own STEM workforce begins with K-12 education. This program really addresses critical pathway issues for STEM by providing K-12 students with role models in the Fellows and teachers with current content. --Evaluation reports from AIR.</p>	<p>APPROPRIATE</p>

14. Discuss any concerns relevant to the quality of the projects or the balance of the portfolio. *Overall quality of various aspects is good, with the reservations and opportunities noted above. Opportunities to include community colleges and industries should be explored.*

A.5 Management of the program under review. Please comment on:

1. Management of the program.

Comments:

One program director and staff does the overall program management, all the review panel work and all the pre- and post-award documentation and correspondence. This includes some early cross-directorate communication and coordination about review panel members, pooling of funding etc. Given the number of proposals and all the relevant management work, the program director and staff have done an outstanding job.

On examination of the entire workload, the COV feels strongly that additional program staff at the level of a program officer should be appointed to assist in the activities that must be implemented in this program. The major concern here is that with the number of awards that are currently active and the additional ones that come on-line every year, the number of awards/jackets that the current single Program Director must handle and respond to, can result in an unreasonably large workload for the current director and staff.

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

Comments: *The program has been very responsive to an important, indeed vital, national need – to develop our own STEM workforce. By engaging emerging STEM professionals in K-12 education and work with the teachers, the learning and awareness of all parties are enhanced in a lasting way. Young students have role models in the graduate Fellows; the teachers get to work with University scientists and engineers in emerging areas and get content enrichment.*

As suggested above, this situation gives a unique opportunity to engage the young emerging scientists (Fellows) in educational research as, thus truly integrating education and research.

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

Comments: *The process and development of the portfolio is commendable and the vision is being realized. Indeed the program is an innovative model of collaboration and leveraging in an area of high need.*

4. Additional concerns relevant to the management of the program.

An observation of the COV was the fact that the Evaluation reports done by AIR use combined GRE scores as a quality indicator. The fallacy of combined GRE scores is now well understood in the evaluation community and it is disappointing to see its continued use.

PART B. RESULTS OF NSF INVESTMENTS

NSF investments produce results that appear over time. The answers to the first three (People, Ideas and Tools) questions in this section are to be based on the COV's study of award results, which are direct and indirect accomplishments of projects supported by the program. These projects may be currently active or closed out during the previous three fiscal years. The COV review may also include consideration of significant impacts and advances that have developed since the previous COV review and are demonstrably linked to NSF investments, regardless of when the investments were made. Incremental progress made on results reported in prior fiscal years may also be considered.

The following questions are developed using the NSF outcome goals in the NSF Strategic Plan. The COV should look carefully at and comment on (1) noteworthy achievements of the year based on NSF awards; (2) the ways in which funded projects have collectively affected progress toward NSF's mission and strategic outcomes; and (3) expectations for future performance based on the current set of awards. NSF asks the COV to provide comments on the degree to which past investments in research and education have contributed to NSF's progress towards its annual strategic outcome goals and to its mission:

- To promote the progress of science.
- To advance national health, prosperity, and welfare.
- To secure the national defense.
- And for other purposes.

Excellence in managing NSF underpins all of the agency's activities. For the response to the Outcome Goal for Organizational Excellence, the COV should comment, where appropriate, on NSF providing an agile, innovative organization. Critical indicators in this area include (1) operation of a credible, efficient merit review system; (2) utilizing and sustaining broad access to new and emerging technologies for business application; (3) developing a diverse, capable, motivated staff that operates with efficiency and integrity; and (4) developing and using performance assessment tools and measures to provide an environment of continuous improvement in NSF's intellectual investments as well as its management effectiveness.

B. Please provide comments on the activity as it relates to NSF's Strategic Outcome Goals. Provide examples of outcomes (nuggets) as appropriate. Examples should reference the NSF award number, the Principal Investigator(s) names, and their institutions.

B.1 OUTCOME GOAL for PEOPLE: Developing "a diverse, competitive and globally engaged workforce of scientists, engineers, technologists and well-prepared citizens."

Comments:

GK-12 is a "people" program designed to lead to institutional transformation in the institutional culture of STEM. The choice of STEM graduate students as one of the actors in changing this culture has an inherent tension between the conventionally defined (and perceived) role of the graduate student and the expectation of a GK-12. This needs to be explored.

This program addresses a critical national need – STEM workforce development in all of K-20 education levels..

Some outstanding examples and features

Large cohort of African American Fellows:

NSF DGE-0338261—Llewellyn—Georgia Tech—GK-12: STEP-Up!!

Publications in Eng Education Forums

Two prior Fellows are now Assistant Professors in Academia

Three hold research positions in Industry

One is a High School math Teacher

Fellows are now found in 11 departments in 4 Colleges

21 Fellows are African-American

Georgia Tech administration has acknowledged the importance of this endeavor by establishing an Educational Partnership Award of \$7,500 awarded annually to a partnership consisting of a Georgia Tech faculty member, a Georgia Tech student, and a K-12 teacher. In 2004 the team that was recognized carried out their project at a 99% African American, low income urban high school. The GT K-12 Fellow will present this project as a paper at the ASEE national conference in June.

-- Large cohort of Hispanic Fellows:

NSF DGE-0338193—University of Puerto Rico-Mayaguez---J. Lopez Garriga

Over 20 Hispanic Fellows interacting with 277 Hispanic K-12 teachers

-- Overall, the program has very high involvement of minority K-12 teachers and students.

--Interaction with industry in the UNC-Charlotte project NSF DGE- 0231883 – David Royster

B.2 OUTCOME GOAL for IDEAS: Enabling “discovery across the frontier of science and engineering, connected to learning, innovation, and service to society.”

A fertile ground for ideas that is not fully explored here is that of integrating STEM educational research with the research in the disciplines themselves. Because of the Fellows’ simultaneous experience in both these areas, this program provides great potential.

Comments:

Exemplary projects:

NSF DGE-0338215---Raineri—U Illinois—GK-12 EdGrid Project

SITE Best Paper Award, for

« What Science and Technology Mean to High School Learner » joint paper by teacher and Fellow

NSF DGE-0337949 San Francisco State University in Track II moving towards inclusion of science education in MS thesis and component of masters training program

B.3 OUTCOME GOAL for TOOLS: Providing “broadly accessible, state-of-the-art S&E facilities, tools and other infrastructure that enable discovery, learning and innovation.”

Advancement of tools is harder to achieve in this project given all the other dimensions. There are still some good examples that should be publicized so others can see what is possible and also become creative in this dimension.

Comments:

Examples of « tools »

NSF DGE-0338215 The Ed-Grid project mentioned above develops teaching software.

NSF DGE- 0440557 UCF Science Suitcase is an example of a collaboration with the Science Center to make these available to broad range of people.

NSF DGE-0231573 Syracuse University has developed and published a rich set of curricular modules.

NSF DGE-0231834 University of South Florida has a different approaches to “tools”, this project maximizes hands-on manipulative activities for students ranging from gifted to severely learning disabled students, to suit the diverse learning styles and needs.

B.4 OUTCOME GOAL for ORGANIZATIONAL EXCELLENCE: Providing “an agile, innovative organization that fulfills its mission through leadership in state-of-the-art business practices.”

Comments: *Goal: Post-award management*

--Recognizing the challenges of cross-directorate financial management, we encourage continued exploration of more flexible funding mechanisms that enable directors to address in a timely fashion, innovative interdisciplinary and high-priority programs.

--There is good cross-directorate collaboration in the pre-award phase. We recommend developing mechanisms for similar post-award collaboration and synthesis , for example in reading and responding to annual, final and evaluation reports

--Example at the project level NSF DGE-0231833 (Royster) UNC Charlotte, shows graduate students the role that industry and non-profits play in improving GK-12 education using a different kind of science network as part of their management team. Developing local industry partners can be an important element in sustaining the program after the grant period.

PART C. OTHER TOPICS

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

- Continued attention should be paid to assessment of grad student outcomes. The COV is concerned that the graduate students not be at any disadvantage in the perception of their colleagues and in their actual progress toward a degree.*
- Move from multidisciplinary (merely involving Fellows from different disciplines) to more truly interdisciplinary approaches.*
- Explore possibilities of integrating Fellows' STEM research with education research in the discipline as part of GK-12 activities*
- Involve more disciplines, e.g. social science, geology.*
- Encourage partnerships involving community colleges and industries for reasons cited above.*
- Look for opportunities for the K-12 teachers to work toward advanced degrees.*
- The place of Masters Degree programs in the GK-12 program needs to be thought through. We encourage Program officers to think about project design and evaluation strategies to have multiple models. Imagine a set of outcomes that are different for MS and PhD. Professional MS should be part of the portfolio. MS degrees prepare for teaching in community colleges, an important pathway for STEM workforce preparation.*
- Different outcome measures may be appropriate for MS and PhD granting programs.*

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

- The program-specific goals are being met well overall.*
- While efforts in this regard are commendable, the program should continue its efforts to increase the participation of larger numbers of GK-12 fellows from underrepresented populations to serve as role models.*
- The COV feels that the importance of increasing the pool of GK-12 Fellows from underrepresented groups cannot be stressed enough. It will be these GK-12 Fellows who will serve as role models for most of the K-12 students served by this program and ultimately have the greatest impact on increasing the numbers of future scientists and engineers from underrepresented populations. The program's success in this regard should be measured by how well this is achieved across all grants and states. For example, there should be more Hispanic representation in Texas and other sites besides just the grants in Puerto Rico."*
- Increase involvement of teachers with NSF. Turn annual meeting into a showcase: A section of the PIs meeting should have the teachers present their experiences to NSF and give Awards or Certificates.*
- The GK-12 Program can really change K-20 education by encouraging the teachers toward a content degree.*
- Insist on closer adherence to Program Goals and objectives for Track II proposals*

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

- *Staffing needs to be adequate to handle the enormous volume of pre- and post-award documentation including annual and final reports.*

- Increase in stipend level has made it difficult to bring new programs on, and for universities to sustain existing programs. NSF should continue to work with agencies and other undergraduate educational systems to explore this issue.*

- *Change level of responsibility of graduate students*

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

The GK-12 program should be embraced as an opportunity for all directorates to address future workforce needs in their areas and across disciplines. While there may be a number of improvements that can be made to the program over time, it is important to note the significant contribution that this program has made in bringing together or creating partnerships between higher education in the sciences and engineering and the K-12 environment, leading to many other outcomes listed below.

-- *One of the outcomes of the GK-12 is that it is the first program of its kind to involve STEM graduate students in K-12 education in a required and proactive way. This has clearly been a positive force in producing innovative approaches to true partnerships between higher education and K-12*

--*It has been important in developing leadership in teachers, graduate students (future faculty) as members of the larger educational community.*

--*The program fosters new partnerships and crosses boundaries in the academy: among education and science research faculty in Universities for example.*

- *In particular, the contribution the program has made to enhancing the self-esteem and retention of K-12 teachers, especially given the many societal and economic challenges faced by teachers in this environment, should be viewed as a major positive element of this program.*

The self-esteem of K-12 teachers by being recognized as partners and full colleagues by higher education is a highly desirable outcome. A high percentage, 50%, (Heydrick in Science teacher retention: Mentoring and Renewal. Rhoton and Bowers, Eds., 2003, NSTA Press) of teachers are lost to the system in the first 5 years. Some of the projects have probably helped in retention of science teachers especially in the hard sciences where they could go to jobs with better opportunities. If this is true, we should document this outcome. Assessment should be conducted of teachers' perception of whether participation in these programs has made a difference to their staying in the profession.

--*Graduate students have a tremendous learning opportunity. This may be the only time they interact with K-12.*

-- Educators across the nation are talking about PK-20 education. This is a good example of producing an educational system rather than isolated entities along the educational pipeline. BUT, . NSF should be pushing the curve.

--Interaction and synergy with various programs is strongly encouraged: with RET, LSAMP, AGEP. To increase minority participation among Fellows, NSF should contemplate partnership with minority student enrichment opportunity programs such as LSAMP, MARC, DOE-GANN and other similar programs.

-- It is vital to have longitudinal studies of the impact of the program on graduate students:

(1) Impact on time to degree and learning and career outcomes;

(2) What are Fellows' first jobs and subsequent career paths? Are they in postdoctoral positions?

PIs should report these as part of final reports.

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

Some parts of this form is not quite appropriate for this program. However, it works overall.

SIGNATURE BLOCK:

For the GK-12 COV
Indira Nair
Chair