

CORE QUESTIONS and REPORT TEMPLATE
for
FY 2008 NSF COMMITTEE OF VISITOR (COV) REVIEWS

Guidance to NSF Staff: This document includes the FY 2008 set of Core Questions and the COV Report Template for use by NSF staff when preparing and conducting COVs during FY 2008. 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 <www.inside.nsf.gov/od/oiac/cov>.

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.

Suggested sources of information for COVs to consider are provided for each item. As indicated, a resource for NSF staff preparing data for COVs is the Enterprise Information System (EIS) –Web COV module, which can be accessed by NSF staff only at <http://budg-eis-01/eisportal/default.aspx>. In addition, NSF staff preparing for the COV should consider other sources of information, as appropriate for the programs under review.

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. 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. For past COV reports, please see <http://www.nsf.gov/od/oia/activities/cov/covs.jsp>.

**FY 2008 REPORT TEMPLATE FOR
NSF COMMITTEES OF VISITORS (COVs)**

The table below should be completed by program staff.

Date of COV: September 18-19, 2008
Program/Cluster/Section: Informal Science Education/LLC
Division: Division of Research on Learning in Formal and Informal Settings
Directorate: Education and Human Resources
Number of actions reviewed: Awards: 49 Declinations: 21 Other: 11
Total number of actions within Program/Cluster/Division during period under review: Awards: 174 Declinations: 833 Other: 679
Manner in which reviewed actions were selected: A computer generated random selection program was used.

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 process. Provide comments in the space below the question. Discuss areas of concern in the space provided.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE ¹
<p>1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?</p> <p>Comments:</p> <p>The COV members were uniformly impressed with the seriousness and quality of the review methods. We found strong evidence in the jackets of] a clear difference in quality between funded and unfunded proposals, well documented by both ad hoc and panel reviews. The detailed comments and guidance provided to the PI during and after the review process were evident in most cases, and the concurrence around funding decisions was impressive. We found no evidence of site visits and presume that this was not used as one of the review methods.</p> <p>In general, there was a proper balance between scientists and practitioners representing the informal science education field. Some members of the COV pointed to occasional reviews that were minimal in scope and technical detail, and we suspect that this is a consequence of trying to attract a number of new reviewers from disparate backgrounds. These problems were small in number and a worthwhile risk for broadening participation on the review panels.</p> <p>The COV suggests that more attention be paid to attracting reviewers with greater budgetary skills and, when appropriate, reviewers who could better comment on dissemination and marketing strategies, particularly for multimedia and exhibit based proposals.</p>	<p>YES</p>

¹ If "Not Applicable" please explain why in the "Comments" section.

<p>2. Are both merit review criteria addressed</p> <p>a) In individual reviews?</p> <p>b) In panel summaries?</p> <p>c) In Program Officer review analyses?</p> <p>Comments:</p> <p>The COV was very impressed by the close attention paid to the criteria of "intellectual merit" and "broad impact" of the proposed activity, by individual reviewers, by the panel review, and most impressively by the review analyses of the Program Officers. Uniformly, the Officers went well beyond simply summarizing the reviews and provided valuable insight, analysis, and perspective that strengthened the case for the final decision on support.</p>	<p>YES</p>
<p>3. Do the individual reviewers provide substantive comments to explain their assessment of the proposals?</p> <p>Comments:</p> <p>In general, individual reviewers provided substantive comments consistent with their rating of the proposals, though as noted above there were occasional examples of minimal reviewer responses to either the criteria or subsidiary issues, which the COV attributed to inexperienced reviewers. More frequently, reviewers wrote comprehensive, well written comments clearly designed to provide helpful assistance to PIs in carrying out the research objectives of funded proposals or, for rejected proposals, to help in subsequent resubmissions.</p>	<p>YES</p>
<p>4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)?</p> <p>Comments:</p> <p>We were impressed by the general consistency of the scores and by the detailed comments of the panel, stressing the adherence to the clearly stated review criteria. An added value of a panel is bringing together people with different expertise and relevant experiences, and this contributed to the richness and value of this form of review. We do question the value of the codes H,M,L, provided seemingly without explanation at the bottom of the panel report and urge that the meaning of these be clarified in the written summaries.</p>	<p>YES</p>

<p>5. Does the documentation in the jacket provide the rationale for the award/decline decision?</p> <p>(Note: Documentation in jacket usually includes context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), program officer review analysis, and staff diary notes.)</p> <p>Comments:</p> <p>The COV found this electronic format extremely helpful in being able to retrieve and compare the various documentation needed to make an informed review decision. However, there were many cases of what appeared to be missing information, such as correspondence between the PO and the PI, annual reports, and backgrounds of reviewers and of some of the people listed as key members of the proposal. We are assuming that much of this is a byproduct of the transition from jackets to electronic files and anticipate fully complete dossiers in the future. These occasional deficiencies in documentation were more than compensated by the quality of the reviews and, as mentioned earlier, by the quality of the PO's extensive justification for the decision reached.</p>	<p>YES</p>
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<p>6. Does the documentation to PI provide the rationale for the award/decline decision?</p> <p>(Note: Documentation to PI usually includes context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), and, if not otherwise provided in the panel summary, an explanation from the program officer (written or telephoned with diary note in jacket) of the basis for a declination.)</p> <p>Comments:</p> <p>Clearly the documentation to the PI provided the rationale for the award/decline decision. The only issue raised by the CoV was the extent to which the PO subsequently works with the authors of declined proposals to help them resubmit. Such outreach is of considerable importance for proposals submitted by PIs from under represented individuals or by younger or otherwise inexperienced proposers. Such targeted intervention and counseling may already be occurring, and the COV would welcome additional details whether this in fact is occurring.</p>	<p>YES</p>
<p>7. Is the time to decision appropriate?</p> <p>Note: Time to Decision –NSF Annual Performance Goal: For 70 percent of proposals, inform applicants about funding decisions within six months of proposal receipt or deadline or target date, whichever is later. The date of Division Director concurrence is used in determining the time to decision. Once the Division Director concurs, applicants may be informed that their proposals have been declined or recommended for funding. The NSF-wide goal of 70 percent recognizes that the time to decision is appropriately greater than six months for some programs or some individual proposals.</p> <p>Comments:</p> <p>SE is to be congratulated for both the thoroughness of the entire review procedure and their commitment to timeliness. However, the COV recommends that attention should be paid to what appears to be a trend of increasing time for final action for awards. This has not been the case for declinations. It appears most likely that staffing shortages and attendant work load increases are a most likely cause for this increase. Even with the increasing challenge of short staffing, on average across this time period ISE is close to reaching if not exceeding the NSF Annual Performance Goal described above.</p>	<p>YES</p>

Comment [HU1]: We could append the dwell time figures supplied by NSF.

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

SE is to be congratulated for both the thoroughness of the entire review procedure and their commitment to timeliness. However, the COV recommends that attention should be paid to what appears to be a trend of increasing time for final action for awards. This has not been the case for declinations. It appears most likely that staffing shortages and attendant work load increases are a most likely cause for this increase. Even with the increasing challenge of short staffing, on average across this time period ISE is close to reaching if not exceeding the NSF Annual Performance Goal described above.

A.2 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 ²
<p>1. Did the program make use of reviewers having appropriate expertise and/or qualifications?</p> <p>Comments:</p> <p>The COV found that ISE PO's do a very good job of making sure the right expertise is brought to bear on the review process. Two areas for future consideration in terms of strengthening the quality and diversity of reviewers are recruiting experts in (1) new media, an area where the technology is changing quickly and on which applicants/grantees are depending for effective dissemination; and (2) broadcast media/public relations, an area many grantees depend for increasingly broad dissemination.</p>	<p>YES</p>
<p>2. Did the program use reviewers balanced with respect to characteristics such as geography, type of institution, and underrepresented groups?</p> <p>Note: Demographic data is self reported, with only about 25% of reviewers reporting this information.</p> <p>Comments:</p> <p>The COV found that ISE is diligent in this regard. The COV also realizes that recruiting from underrepresented groups will remain a challenge for ISE. The COV recommends that ISE continue to strive for geographical, institutional and</p>	<p>YES</p>

² If "Not Applicable" please explain why in the "Comments" section.

<p>underrepresented group balance and consider using CAISE to assist in the identification and nurturing of minority reviewers (i.e., CAISE Fellows).</p>	
<p>3. Did the program recognize and resolve conflicts of interest when appropriate?</p> <p>Comments:</p> <p>The COV believes ISE does a fine job in this regard. The COV noted that, as the definition of COI broadens, this may create challenges in securing qualified reviewers. It is important that the quality of reviews not be eroded by overly zealous definitions of COI, such as eliminating all together any reviewer from the same institution if a proposal from that institution is submitted, as opposed to the recusal policies of the past. If such a policy of institutional exclusion exists, we ask the NSF to reconsider it.</p>	<p>YES</p>

4. Additional comments on reviewer selection:

The COV encourages ISE to continue to expand the community of reviewers. One way to do this may for ISE to consider "panel observers" (providing pre-review exposure). ISE may wish to consider new PI's who were denied funding as possible "panel observers."

A.3 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.

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE ³ , OR DATA NOT AVAILABLE
<p>1. Overall quality of the research and/or education projects supported by the program.</p> <p>Comments:</p> <p>The research and education projects supported were of high quality. In addition, the quality standard was appropriate: All of the proposal that were reviewed and that were supported were strong, some of those that were supported were exceptional, and none of the projects that were denied were strong.</p>	<p>YES</p>
<p>2. Does the program portfolio promote the integration of research and education?</p> <p>Comments:</p> <p>The program does support the integration of research and education. Some of the strongest ISE projects demonstrate an integration of research and education in non-traditional ways, such as innovative approaches for the communication of current and complex science to general audiences (e.g., DRL-0813541: Life-sized, 3D Artificial Intelligent Virtual Humans serving as museum guides) . The program portfolio recognizes both traditional integration of research and education (such as proposals with strong educational research components) and non-traditional integration of research and education. It is essential that every project contributes to the knowledge base even if every project does not conform to traditional research approaches.</p>	<p>YES</p>

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

<p>3. Are awards appropriate in size and duration for the scope of the projects?</p> <p>Comments:</p> <p>In most cases, the portfolio of awards is appropriate in size and duration for the scope of the projects. Reviewers wondered if a subset of awards within particular categories of awards, such as large film or television awards, might sometimes not have enough money to be successful. In general, a trend towards fewer awards of large amounts in categories such as large film and television is recommended to provide the greatest possibility of success.</p>	<p>YES</p>
<p>4. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Innovative/potentially transformative projects? <p>Comments:</p> <p>We refer to Arden Bement's definition of transformative research in our response: "Transformative research is ... research driven by ideas that stand a reasonable chance of radically changing our understanding of an important existing scientific concept or leading to the creation of a new paradigm or field of science. Such research also is characterized by its challenge to current understanding or its pathway to new frontiers." (January 4, 2007). The reviewers therefore viewed "innovative" as projects with novel or creative ideas, approaches or perspectives, whereas "transformative" projects represent projects with the combination of both novel or creative ideas/approaches and significant impact, such as research that radically changes understanding of an important scientific concept.</p> <p>Reviewers recognized projects that represented both innovation and transformative potential, although--as the projects reviewed were still in the first few years of funding--the degree of transformative impact is much more difficult to determine at this point. Innovative projects were observed as representing novel work and innovation in many ways, including an increasing percentage of projects that integrated ideas across the traditional ISE categories of exhibits, community, and film/television, as well as projects that exhibited novel combination of media within a single project (e.g., 0610352 using mobile phones to expand exhibit learning beyond the visit to the science center; 0610427 WolfQuest: 3D multiplayer game allowing learners to become virtual wolves (avatars) focused on survival among a wolf pack of other users/simulated wolves within an authentic simulation environment). We also noticed a trend in the portfolio towards projects with transformative potential, and we were pleased to see this trend. We encourage continued efforts to seek out, and to prioritize, projects that push traditional boundaries of discipline, research, and learning. However, as discussed later in Section C-4, we do not recommend that every proposal be judged by its transformative potential, and we support funding innovative projects that are not transformative.</p>	<p>YES</p>

5. Does the program portfolio have an appropriate balance of:

- Inter- and Multi- disciplinary projects?

YES

Comments:

The COV was not provided with a clear definition of "interdisciplinary" and "multidisciplinary." The COV did discuss this issue briefly and believed that there were numerous examples of multidisciplinary projects. Multidisciplinary here is defined as the collaboration of several science disciplines such as physics and engineering. However, there is little evidence that true interdisciplinary projects exist, that is, the integration of several disciplines toward a common scientific problem or task. This is outside the scope of the IES program.

<p>6. Does the program portfolio have an appropriate balance considering, for example, award size, single and multiple investigator awards, or other characteristics as appropriate for the program?</p> <p>Comments:</p> <p>The COV expresses no matters of concern in this area. Within the subset of jackets reviewed by the committee, no characteristics of the portfolio were identified as "inappropriate" with respect to these characteristics.</p>	<p>YES</p>
<p>7. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Awards to new investigators? <p>NOTE: A new investigator is an investigator who has not been a PI on a previously funded NSF grant.</p> <p>Comments:</p> <p>Awardees tend to be previous award recipients. There is no evidence that the review process actually considers the issue of balance between newcomers and well-known recipients. The COV believed that it would be useful to examine the backgrounds of PIs, whether or not they have been previously awarded a grant. One strategy for increasing the pool would be to identify one section of the portfolio for new investigators. Developing a restricted category for new investigators would expand the number of new applicants, build a larger talent pool, and increase the possibility of receiving more innovative proposals. This new category might also include the number of applicants from non-dominant communities. If this kind of balance is important to the program portfolio, NSF might consider how to address this issue in the review process in ways that maintain the rigor currently employed.</p>	<p>YES</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>Thanks to a good staff summary of proposals by state, it is clear that solicitations have attracted a broad geographical distribution of proposed projects. It appears, without extensive analysis, that the resultant distribution of Principal Investigators is similarly broad nationally. Within the subset of jackets reviewed by the committee, there was notable geographical distribution of proposals and awards. As a note on "appropriate balance", while the COV recognizes the political and social significance of ensuring a nationwide distribution of NSF resources, we also commend the continued focus on quality of each individual proposal as the primary driver of success in the review process.</p>	<p>YES</p>

<p>9. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Institutionnel types? <p>Comments:</p> <p>The review process has clearly resulted in a range of institutional types represented in the portfolio. Awards have been given to colleges and universities from small two -year institutions to major research institutions. The predominance of proposals, successful and unsuccessful, has come from "Business, State and Local, Foreign and Other Institutions". Many of the latter have come from museums and media organizations. It is reasonable to assume that broadening the distribution of reviewers from different types of institutions aids in supporting this objective. Laudable staff efforts toward generally "broadening participation" have had a positive impact here as well. Presumably, the categories of institutional type are standard across NSF, but it might be helpful for future CoV's to get a breakdown of the types of institutions in this "Business,...." category.</p>	<p>YES</p>
<p>10. Does the program portfolio have an appropriate balance:</p> <ul style="list-style-type: none"> • Across disciplines and sub disciplines of the activity? <p>Comments:</p> <p>This question is difficult to address in any kind of quantitative way. There is certainly appropriate variety in the nature of the projects from large screen format films, to public radio programming, to the creation and support of new networks of experts, to museum exhibits, to supplementary awards to researchers to communicate their work and "broaden impact". There is also great variety in the disciplinary topics addressed in the portfolio. These include everything from sharks to nanotechnology, the cosmos, game-based learning and informal science learning in museums. The committee commends the breath of disciplines and sub disciplines represented in the portfolio without a specific recommendation on the relative weight of each area. As emphasized in A-3-8, the focus for the portfolio must continue to be the quality of projects in it, but with continuing attention to "balance" among various other attributes.</p>	<p>YES</p>
<p>11. Does the program portfolio have appropriate participation of underrepresented groups?</p> <p>Comments:</p> <p>The COV did have several concerns about the nature of participation and the role non-dominant people play in the proposed and funded projects. Few PIs come from minority groups. Consider that 14% of women, as compared to 8% of minority females direct the overall project. The COV believed that this is career ladder issue in which minority personnel occupy fewer positions of influence or intellectual leadership. The COV asks if there are mechanisms in place that allow for upward mobility in the projects? What kind of mentorship</p>	<p>YES</p>

<p>opportunities can be put in place to help grow cohorts of PIs from underrepresented communities? New forms of mentorship may be required to build capacity in targeted populations. Short-term mentorship workshops should be replaced with more substantive, longer-term relationships that build capacity. Such programs would include opportunities to learn from the inside what constitutes a strong proposal and project. Opportunities for ad hoc roles in reviewing proposals, grant-writing and grant management training would be important areas to address. There could also be incentives to senior PIs to include qualified, but novice CO-PIs from under-represented groups.</p>	
<p>12. Is the program relevant to national priorities, agency mission, relevant fields and other constituent needs? Include citations of relevant external reports.</p> <p>Comments:</p> <p>The overall program clearly addresses national priorities, notably expanding the public's understanding of science by using existing and new institutions and scholarly and community networks. Two new reports extol the importance of informal science learning environments: The forthcoming NRC report, Learning Science in Places and Pursuits: The Contributions of Informal Environments on Learning, and the impact study by EXCITE. NSF should consider elaborating the importance of informal learning in their report to Congress.</p>	<p>YES</p>
<p>13. Additional comments on the quality of the projects or the balance of the portfolio:</p> <p>The COV encourages NSF to consider more innovative approaches to helping the public understand science. What would it take to create a science savvy culture? How do you develop science inquiry as shared practice? In Europe, dialogue houses and cafes are surfacing; comparable public spaces could be identified in the U.S., particularly in low-income and rural areas where there are fewer organized opportunities and collective spaces for inciting interest in science and building capacity.</p> <p>There is a strong push in the field of literacy toward multiple literacies. The program portfolio includes projects that seek to combine science with new technologies. This trend should be continued.</p> <p>A persistent measurement problem is concerned with the question: What do people really learn outside of school? In informal learning environments? What difference do we make? More attention to this issue should be considered in the project interim and final reports. In short, more attention should be given to what is learned in broad terms and relative to specific content learning. The recent report on how to evaluate ISE project results is a good step in this direction.</p>	

A.4 Management of the program under review. Please comment on:

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1. Management of the program.

Comments:

The administration of the ISE program is outstanding. As noted in other sections of our report, the processes by which proposals are handled and awards managed are efficient, fair, and effective. Communication among the program officers directly responsible for ISE is excellent. The ways in which decisions are made stress collegiality, collaboration, and consensus. The program officers have substantial experience in their roles and detailed knowledge about the many aspects of informal science education.

The ISE program has maintained a policy of enabling submissions twice yearly, a commendable practice we urge the program to continue, even though this requires substantial additional effort from program officers compared to the once a year submissions now typical in many other EHR programs.

At times during the period of this review, the ISE program has been seriously understaffed. While staffing levels are improving, this report recommends several ways in which the role of program officer might expand to include additional responsibilities. Unless such an expansion of duties is accompanied by a further expansion of staffing, serious strains on program officers may result. Accordingly, we recommend that NSF continue to monitor workload, making further investments in the number of ISE program officers as needed. In part, this could take place through increased efforts to recruit "rotators" from the full range of ISE stakeholder groups, rather than simply from universities.

We note the shift in program policy from preliminary proposals (which receive internal review) to letters of intent (which do not). We recommend that the ISE program officers study the results of this shift in terms of workload, proposal quality, and diversity of applications. For example, we believe that over time letters of intent will result in higher levels of full proposals submitted, creating major challenges for a relatively small program staff to manage large numbers of simultaneous review panels. We also are concerned that many of these full proposals may be of lower quality because the feedback underlying preliminary proposals has been eliminated.

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

Comments:

The CoV notes that program officers have given careful thought to the many ways informal science education is evolving. The audiences, delivery methods, and pedagogy of informal science education are changing rapidly and dramatically. In turn, the ISE program is considering ways by which its portfolio can include experiments with emerging interactive media, to determine their strengths and limits for informal science education. The program officers are commendably aware of opportunities to reach new audiences and underserved groups by using these emerging technologies.

We recommend that the program officers also consider ways of using media for knowledge co-creation and sharing (e.g., wikis, social networking, blogs) to interconnect awardees electronically, as well as to provide e-mentoring opportunities for investigators seeking a grant. For example, experienced principal investigators could conduct webinars that provide guidance for novice applicants. Pre- and post electronic activities could complement face-to-face meetings of program awardees and applicants.

Through its cyberinfrastructure initiative, the Foundation as a whole is emphasizing the opportunities new technologies provide for both research and education. We recommend that the program officers keep in close touch with cyberlearning activities at NSF and work with the personnel making those grants to include informal science education in their portfolio. In general, we recommend increased outreach on the part of ISE program officers to other programs within EHR, given the blurring lines between in-school and out-of-school learning due to the use of new technologies that follow learners around no matter the setting.

The K-12 curriculum, unfortunately, typically covers science only up through the 19th century, leaving out 20th and 21st century scientific developments. This means that informal science education is the vehicle by which both the general public and students learn the sciences underlying some of the most important decisions our society faces (e.g., what to do about global climate change). We recommend that the ISE program place special emphasis on these "recent" sciences in its portfolio. The current emphasis on nanotechnology is an excellent example.

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

Comments:

We commend the program staff for thinking carefully about ISE portfolio investments along multiple dimensions, including emerging technologies and sciences (as discussed above). We also are happy to see the outreach activities ISE program officers are using in their planning and prioritizing, such as the Principal Investigator summit. The newly funded CAISE Center is another vehicle that can help link the ISE program closely to its diverse stakeholders.

We urge a particular emphasis on diversity in two respects: 1) broadening the range of awardees to include more representatives of diverse groups and 2) prioritizing funding programs that reach underserved populations.

Both involve capacity building in the field of informal science education. As discussed earlier, one way in which this capacity building could occur is enabling observers to attend review panels, by invitation, in order to help naïve applicants understand how to develop competitive proposals and how to serve as effective reviewers. A second means of capacity building would be the set-aside of some ISE program resources for competitive awards to first-time investigators, as a way of increasing the diversity and scope of awardees. We recommend that the ISE program officers experiment with innovations such as these to determine their effectiveness in capacity building. Ways in which CAISE could aid in capacity building are discussed elsewhere in this report.

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

Comments:

The program's response to the 2005 CoV recommendations is excellent. The Response made in September, 2005 is detailed and systematic in its consideration of each point that CoV made and in its commitment to acting on those recommendations. The more recent ISE program spreadsheet documenting responsive activities from the 2005 Cov report through September, 2008 shows the progress the program has attained in carrying out the promises made in its 2005 Response. In our examination of program processes, the recruitment of reviewers and the formation of panels has improved in the ways the 2005 CoV suggested. The electronic systems now in FastLane also are improving award documentation and acting as an e-Business system, as the 2005 CoV

recommended.

NSF has recently increased staff size, as recommended by the 2005 CoV, but the program was understaffed for much of the period our CoV addresses. NSF has not acted on the 2005 recommendation to increase staff travel. This is difficult given the fact that the present program staff are all federal employees and restricted in their travel options. Should the program recruit rotators to serve as additional staff, as recommended earlier, those program officers would have increased amounts of travel money to help manage projects.

Decreasing proposal dwell time and encouraging a more diverse set of principal investigators are both challenging issues on which the ISE program officers are working. Other sections of this report set forward our recommendations on these challenges.

Through mechanisms such as the Principal Investigator meeting and the selection of reviewers with research backgrounds, the program officers have worked to improve the level of scholarship and research in the program. We commend the new Frameworks for Evaluating ISE Projects publication and the outreach activities associated with this. The two NRC consensus studies on ISE research also are a valuable contribution.

However, in many ways ISE investigators conducting research in their projects is problematic because many grants are oriented to implementation and impact and led by PIs who do not have strengths in research. The inclusion of outside evaluators aids with project quality and with scholarship, but evaluation is not research. As discussed later in Section C, one way of meeting this challenge is to group implementation-oriented projects based on common characteristics (e.g., large-scale use of broadcast media), and then, for each cluster of projects, competitively fund a research organization funded to study them. In this manner, the program can generate high quality research findings without imposing goals on the implementation projects that they are ill-prepared to meet.

5. Additional comments on program management:

As discussed later, it is difficult to determine the outcome of program investments because too little information is collected on project findings and impacts. The new online system for project monitoring NSF is currently developing will aid in some ways, as will the CAISE Center and the new document on effective evaluation methods. The program officers could also put more pressure on all awardees to contribute "nuggets" of their findings and impacts every year, when NSF requests these as part of its GPRA reporting. We see this as a very important activity because the ISE program is at risk whenever it cannot effectively document the outcomes and value of its investments.

PART B. RESULTS OF NSF INVESTMENTS

The NSF mission is to:

- promote the progress of science;
- advance national health, prosperity, and welfare; and
- secure the national defense.

To fulfill this mission, NSF has identified four strategic outcome goals: Discovery, Learning, Research Infrastructure, and Stewardship. The COV should look carefully at and comment on (1) noteworthy achievements based on NSF awards; (2) ways in which funded projects have collectively affected progress toward NSF's mission and strategic outcome goals; and (3) expectations for future performance based on the current set of awards.

NSF investments produce results that appear over time. Consequently, the COV review may 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.

To assist the COV, NSF staff will provide award "highlights" as well as information about the program and its award portfolio as it relates to the three outcome goals of Discovery, Learning, and Research Infrastructure. The COV is not asked to review accomplishments under Stewardship, as that goal is represented by several annual performance goals and measures that are monitored by internal working groups that report to NSF senior management.

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

B.1 OUTCOME GOAL for Discovery: "Foster research that will advance the frontier of knowledge, emphasizing areas of greatest opportunity and potential benefit and establishing the nation as a global leader in fundamental and transformational science and engineering."

Comments:

The CoV finds that virtually all of the projects that were funded have the potential to enhance understanding of science learning as a result of their innovative approaches to audiences, the scientific content, and/or to the delivery systems employed. Here are some examples from the projects reviewed in this COV.

1. Audiences:

A. "A Participatory Model for Integrating Cognitive Research into Exhibits for Children," by the Boston Museum of Science, involves adults as researchers in their children's learning evolution. It will refine and test seven learning strategies to evaluate their effectiveness in a museum setting. It specifically addresses identified challenges: integrating learning and science, lack of understanding in adults about the importance of exploratory play, and the difficulty of engaging adults in meaningful play with their children. The results will provide guidance to museums and science-technology centers as well as other learning organizations. (714706)

B. The "Science Technology Project" of Youth Radio is designed to draw minority students to STEM subject matter and careers through direct, intensive training in the latest media technologies. A Youth Radio Digital Institute will not only teach them how to work in the world of digital interviewing and editing, but also will provide access to evolving technologies that permit them to participate in collaborative, real-time editing and recording. The strategies of the project build on prior research about learning in informal education settings and use summative evaluation strategies to assess the effectiveness of their multi-layered approach to involving minority youth in the production of programs that can have extremely wide reach. (610272)

C. "Informal Science.org: Building a Web Community for Informal Science Professionals," from the University of Pittsburgh, reaches the critical audience of educators. This project will enhance and extend InformalScience.org, the primary online resource dedicated to the dissemination and development of knowledge about informal science and learning. The redesigned site will include more multimedia elements, an expanded research database, and improved search function. The site will be expanded by adding a quarterly Informal Learning Research newsletter (with AERA), conference reporting, interview articles, monthly evaluation tools, tips articles, Informal Science in the News clipping service, Research Toolkit, and a listserv. As the body of research in informal science education grows, and as the line between in-school and informal educational opportunities blurs, having an easily accessible "home" will make it possible to connect research to practice as new learning becomes available. (610348)

2. Scientific Content:

A. "Flight of the Butterflies," submitted by Filmmakers Collaborative, Inc., has as its centerpiece a large format 3-D film about the biology, life cycle, and habitats of monarch butterflies. In addition, it includes an important component designed to foster citizen science initiatives: Drawing professionals from well-established citizen science efforts, it will create "train the trainer" workshops that will significantly increase the reach of efforts to track and understand the monarchs, thus contributing to the data available for scientific study. (638891)

B. "What's the Use of Plant Colors?" from Andrews University is based on the PI's active research investigating the properties of a subclass of flavonoid plant pigments that affect disease resistance, sunscreen protection, plant pigmentation, and fertility. To involve high school students directly in science research, the project provides hands-on activities involving natural plant pigments and their functions. The project takes the science to the audience where they are, from after-school programs in fairs and the web, rather than occurring in a fixed location that must be visited. This approach has the potential to provide an excellent model for connecting research scientists to young people. (646530)

3. Delivery Systems:

Some projects are using tested delivery systems to learn more about their effectiveness.

A. "Flight of the Butterflies," noted above, will include a study of the comparative strengths of the 2-D and 3-D versions of the film. Past studies of large format films have affirmed the educational potential of this format, but there has been little study about the comparative effectiveness of 2-D versus 3-D, and of whether 3-D viewing can enhance the learning experience. The findings of this study will benefit the large format industry in general.

Some projects are moving into the ever-changing on-line/interactive media environment to test its educational potential.

A. "BioArcade," submitted by Red Hill Studies, is developing a suite of online biology games for youth ages 9 to 13. What makes this initiative unique is that they are including a "modding" feature that will allow learners to create their own customized versions of the games to share with others. In a world where young people are enthralled with online gaming, using this strategy to encourage understanding of fundamental science concepts holds great potential. Currently, there is insufficient understanding both of effective practices for the design of science education games and of appropriate methodologies for evaluating game-based learning. This project brings together an excellent group of researchers and evaluators. If the research demonstrates that strategic modding leads to increased learning, results could have a significant impact on informal science education, starting with museums, after-school programs and websites associated with television programs and then moving beyond, to student-initiated learning. (714779)

B. "Wolfquest: Learning Through Gameplay," from the Minnesota Zoo Foundation, incorporates standards-correlated life science concepts in animal behavior, ecology, and conservation. The standards are embedded in a gameplay process designed to encourage inquiry learning and discovery. Players will experiment with different methods of hunting, establishing territories, and interacting with other wolves to determine the best or fastest way to accomplish the goal of each scenario. Throughout the game, players will see quantitative data about wolves, which will encourage them to base their in-game decisions on real-time mathematical information rather than simply following hunches or human value judgments. The evaluation will provide critical research and direction for the effective use of gaming as a path to improving student interest in and understanding of STEM disciplines. With games a "given" in the lives of young people, learning more about how to use them for this purpose may make a major contribution to both the informal and formal education communities. (610427)

B.2 OUTCOME GOAL for Learning: “Cultivate a world-class, broadly inclusive science and engineering workforce, and expand the scientific literacy of all citizens.”

Comments:

The COV believes ISE is very rich in this area. The depth and breadth of support provided by ISE reinforces the evidence of ISE’s success in achieving this outcome goal for learning. Specifically, projects using new media were a growing part of the portfolio, and many of these projects recognized that differentiations among new media (web, mobile, etc.) are breaking down into growing convergence. The COV believes ISE is very attuned to these changes and suggests that ISE continue to recognize the fluidity of the public demands of accessing information about science.

A number of jackets were very good examples of cultivating a broadly inclusive audience and expanding scientific literacy:

“Peep and the Big Wide World,” from the WGBH Education Foundation, is a series of daily half-hour Emmy Award-winning television programs for 3-5 year-olds that links to the Web with activities for children and their parents and demonstrates ISE’s commitment to reaching a broad audience, particularly an important group developmentally ripe for science literacy (540273).

“Museums and New Family Audiences – Building Relationships” was a conference planned and conducted by the Franklin Science Museum designed to address STEM with under-served families (734835)

“BioArcade” sought to increase children’s understanding of and interest in science through the production and dissemination of an engaging online game suite with key content focused on biology. Using new “modding” techniques, gamers could develop their own bio-based versions of the games for their own use (714779)

In addition, the NSF-funded web site www.informalscience.org was found by the COV to be a very good means to address learning in the field.

The COV suggests that ISE give some consideration to further expansion of its audiences in the future. Specifically, (1) early childhood, when our youngest citizens are most curious about the natural and physical worlds, and (2) the age 50+ audience, who increasingly have the desire, time and resources to learn more about science. A key for the 50+ audience will be to engage them in meaningful ways over periods of time that work with their schedule. The COV also suggests that more emphasis on how we can ensure a workforce that can interpret and analyze data coming from new technology sources (streaming data, satellite, sea floor, etc.) would be a useful investment.

B.3 OUTCOME GOAL for Research Infrastructure: “Build the nation’s research capability through critical investments in advanced instrumentation, facilities, cyberinfrastructure and experimental tools.”

Comments:

For the purposes of this COV report, we are defining “tools” to include research findings in new conceptual areas, websites, exhibit ideas, and the use of scientific tools in a new way to promote informal science education. Some examples of these are:

1. "The City as Learning Lab (CaLL): Spreading Technology Fluency Through Creative Robotics," from the University of Pittsburgh, may result in innovative research findings addressing both the concept of technological fluency as a process and the outcome of informal technology involvement. The experiences of up to 1000 program participants will be documented through several research studies. Findings will establish evidence for how technological fluency can be measured, supported, and developed through informal technology learning experiences. The project also includes research that tracks technological fluency after participants leave these informal educational experiences and try to use their new knowledge and skill at home or in other learning contexts. Broader impacts in informal technology education will be achieved by developing flexible toolkits, which will be shaped by the research results, allowing other communities to adapt and adopt CaLL technologies, curricula, and activities. (741685)

2. "Bringing Research on Learning to Practitioners in Informal Science Environments," from the National Academy of Sciences, is an extension of a study underway to synthesize and summarize the body of research literature on learning in informal settings. The goal of the new project is to translate and apply these research findings through a publication and web site that will be tools to help practitioners use the information to effect practice. (646987)

3. "Fantasy Sports Games as Cultures for Informal Learning," from Pennsylvania State University, builds on youngsters' fascination with online sports games. Players compete with each other by using limited assets to maximize their wins. This project is studying the informal mathematical processes the players use in fantasy basketball games and then will design and implement an informal learning environment that develops mathematical reasoning and decision making for adolescents. (515494)

4. "The Partnership for Playful Learners," from the Chicago Children's Museum, is exploring strategies for increasing adult involvement with children's science learning within exhibition setting. The research results are intended to help others in the field empower parents and other significant adults to understand more fully, and exert in practical ways, their potential to act as children's most influential teachers. A significant focus of the research is investigating how adult-child interactions differ and/or can be generalized among underserved groups. (452550)

5. "Informal Science.org: Building a Web Community for Informal Science Professionals," cited above in B-1, is another example of a project investing in tools that will benefit the field and, thus, the learner. (610348)

Overall, in reviewing these ISE contributions to Discovery, Learning, and Research Infrastructure, the CoV finds that ISE is making excellent investments in these areas and is managing the portfolio in ways that reflect and support the evolving nature of ISE content, audiences, and tools/media.

PART C. OTHER TOPICS

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

The previous ISE COV recommended that ISE continue its efforts to foster the development of the field of informal science education, building on its current sponsorship of conferences, publications, and web pages. ISE can serve as the vehicle of enhanced cooperation amongst the various types of institutions (e.g., museums, communities, media organizations) and can strengthen NSF's role in evolving the field.

ISE should continue to encourage the submission of research-oriented projects and, through outreach activities such as workshops, work to close the gap between researchers and developers. While the quality of the programs funded is high, we found limited evidence of an enhanced research focus. The number of funded project from the top 100 PhD institutions did increase from 2005 to 2006, but then appears to have flattened out. The COV suggests that, for future competitions, a special category of awards be established to promote research on implementation-oriented projects similar in their purpose and methods. For example, ISE could solicit research-intensive proposals to support a cluster of up to 5 projects in related areas (e.g., large media projects) that have limited internal research capacity. This "umbrella" effort could study and assess design strategies, implementation approaches, and project impacts, as well as identifying promising areas for further research.

We support the goals and underscore the importance of the Principal Investigators Meeting that was recently held. Including in future such meetings potential proposers as well as current PIs would be a good strategy for outreach, particularly to under-represented groups. In this vein, we note that minorities are better represented in project support roles than as PIs, even with projects focusing on minority issues. Setting aside a limited amount of funding to be competitively awarded to "first-time principal investigators" would be a way to broaden the range of proposals submitted and potentially enhance the diversity of awardees.

We commend ISE for its recent publication, "Framework for Evaluating Impacts of Informal Science Education Projects," as a means of better documenting impact. We urge that ISE encourage awardees to experiment with novel dissemination methods, such as those based on Web 2.0 media, to ensure that project outcomes reach the widest and most appropriate audiences.

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 COV is supportive of the stated goals and objectives of the ISE program, recognizing its special role in attracting, educating and inspiring broad audiences to explore areas of science and technology, knowledge of which is of critical importance to an educated society (and especially electorate).

An important concern, raised earlier but reemphasized here, is the demographic distribution of proposers, awardees and to a more limited extent reviewers. As an example, the

longitudinal data presented to the CoV shows limited, if any, progress in the number of minority principal investigators both as applicants and as awardees. Recognizing the challenges of a limited pool of potential applicants, we encourage ISE to aggressively engage in effective outreach efforts to this audience, using innovative processes such as those described in other sections of this report and encouraging proposals that build capacity. Opportunities for outreach and capacity building are expanding, since underrepresented groups are often key target audiences for projects that are game or web based.

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

The COV noted that there needs to be more inter-program collaboration. Also, PIs should collaborate more with the target community so that there are mutual relations of exchange. NSF should attend to increasing the number of new grant recipients and funding more proposals with underrepresented scholars in the PI role. As noted previously, a restricted category of funding for PIs who are newcomers is an important first step. Further, there is a need to better define the categories of "high risk," "innovative," and "interdisciplinary."

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

1. The larger environment in which informal science education has traditionally functioned is changing at an unprecedented speed. As delivery processes evolve towards Web 2.0 media, information exchange is quickly moving from one-way delivery to highly participatory communication and increased personal engagement. Geography and time are no longer barriers to interactions and learning. The ISE staff has done an excellent job of keeping up with these shifts, with the results reflected in projects that break down old walls of institutions and delivery systems. The challenge, as this evolution accelerates, will be to continue to stay informed about and open to emerging possibilities.

2. The COV cautions ISE to avoid an over-emphasis on research about learning. Every project need not break new ground in research about informal science education. We believe it is valuable to fund some implementation projects that build on existing sound research and not burden them with the need to argue that there will be new knowledge about learning in informal settings as a result of their work. As discussed earlier, if ISE sees some commonalities across several projects that would deserve some further research about impacts on learning, it could fund a separate category of awards to look at the group and draw conclusions that could benefit the field.

3. The Committee strongly supports the emphasis on projects that are innovative, but sees the recent addition of "transformative" projects as the strongest competitors to be a direction that, if over-emphasized, can actually be damaging to the impact of ISE. The array of funded projects is in fact very innovative – in terms of content, of audiences reached, and of media employed. These projects are positioned to make a difference in how people understand and use the STEM disciplines in their lives. On the other hand, even the meaning of "transformative" is unclear (although we provide a definition in Section A3), and encouragement by ISE to make this the core of every proposal would place an unnecessary burden on applicants. As discussed earlier, were ISE to adopt such a policy at the request of NSF, the result would likely be to discourage applications from those who want to build on

existing research and innovate with content, audiences, and delivery systems. Such an approach would also probably discourage new applicants, as the goals of the program might seem out of reach.

4. As discussed earlier, two audiences could be targets for future emphasis. (1) Early childhood education (pre-K through grade 3) is a period when children are extremely curious about the world. Projects could build on that natural curiosity to create a love of learning about science that then grows with the child. (2) The age 50+ audience is also a group that historically gets less attention. Yet these are people who are eager to keep learning, both for their own personal growth and also to enhance connections to their families and communities. When ISE thinks about “life-long learning,” we encourage you to look at these two ends of the age spectrum, which may be currently underemphasized in the portfolio.

5. The creation of CAISE is a big step forward, providing a mechanism for sharing information and helping the ISE community to build on the lessons learned from previous work. The COV encourages ISE to explore innovative ways to enhance interactions in the ISE community, such as encouraging the creation of virtual social networks to make it easier for individuals with shared interests to connect.

6. The traditional emphasis on encouraging public “understanding” of society is, we think appropriately, moving to an emphasis beyond understanding to engagement, either at a personal or policy level. For example, the further growth of science cafes would provide opportunities for conversation that can lead to a more informed electorate, better able to make decisions in their own lives. We suggest that more active forms of audience participation be emphasized and encouraged to ISE applicants.

7. During the cycle being reviewed, the shift was made from pre-proposals to simply filing a “letter of intent.” As discussed earlier, during the next 18 months we encourage staff to make an assessment of the impact of that change, considering both impact on ISE staff time (e.g., no time on prelims but far more on panels and follow up) and on applications (e.g., new vs. repeat institutions, quality of proposal presentation, quality of project concepts.)

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

The CoV suggests that, in initial CoV instructions, ISE provide additional guidance in regard to definitions of key concepts, i.e. “innovative”, “appropriate level”, “high risk.”

The electronic system for transmitting jackets and related COV materials is obviously a great step forward. The staff is due high praise for its development. Further improvements should be encouraged. It would be a huge help if committee members could locate individual jackets more quickly and simply. A good deal of time was spent trying to find and bring up the desired jacket. Also, some documents in jackets could not be found; indications of whether or not they exist, haven’t been entered yet, or have some other status would be helpful and a significant time saving. Spending more time on training COV members in the use of the system during the webinar would be, we think, time very well spent.

The earlier that staff summaries can be transmitted to the committee, the better. Such documents as reviewer composition and distribution, proposal dwell time and target audiences, and funding rate were very helpful. They provide an important context as individual jackets are reviewed before the CoV meeting. Any additional summaries of known characteristics of the portfolio would be very helpful to receive before the COV meets.

The work of the COV will be greatly strengthened by current efforts to improve the clear articulation of a project's intended impact(s) in the proposal description, to statements about progress in achieving those ends in annual reports, and in final reports about real and demonstrable impacts or outcomes achieved. The committee applauds the initial staff work being done in this regard. An emphasis on impact reporting throughout the project cycle will improve individual project evaluation and enhance the ability to aggregate and assess impacts across the portfolio.

C.6 Given the emphasis on innovation in the Foundation (and in the ISE solicitation criteria and the focus of ITEST) is there evidence from these proposals that these programs are pushing the fields into innovative pathways?

The COV does see evidence that proposals are pushing the field in innovative directions, including the number of recently funded projects that are advancing understanding relative to the novel use of emerging media for informal learning and information sharing [e.g., mobile phones to expand exhibit learning (0610352); 3D virtual humans for science museum guides (080689); and WolfQuest, a 3D multiplayer game allowing learners to become virtual wolves focused on survival among a wolf pack of other users/simulated wolves (0610427)]. While strengths exist, the Committee encourages continued efforts to foster innovation in research approaches that might facilitate greater aggregation of information and lessons learned across subsets of projects (see C8 below for more information on this point).

C.7 Is there evidence in the funded ISE and ITEST projects to indicate that these programs, to date, are having a strategic impact in building the capacity of professionals in the fields, the knowledge base, and the resources and tools necessary for effective work?

The answer to this question is unclear. As previously mentioned, the projects are geographically distributed and target a number of low-income and underrepresented communities. Projects are able to demonstrate this kind of influence. However, there is little evidence about student learning in informal learning environments. What change comes about from participation in these projects? What new networks and collaborative efforts are created? How many underrepresented minorities and women have key decision-making and intellectual roles in the projects? What new tools and tool use emerge in the projects? And what is, in fact, innovative about the project that incites learning? These questions should be addressed in the call for proposals, the review process, and in project reports.

C.8 What is the overall quality of the project evaluation plans (and products, if any), and would you make any recommendations to NSF in this regard?

The COV observed several projects with strong evaluation plans and products. In addition, the COV applauds the forthcoming new data reporting system in the Evaluation Framework as a means to obtain more articulate and generalizable information for the evaluation of

individual and aggregates of projects.

The COV also provides two areas of suggestions for improvement. First, the Committee observed a handful of very strong proposals that did not present articulate information in the "Findings" sections of the annual reports. The COV recommends professional development at future PI meetings to advance understanding of appropriate and articulate data collection and recording methods, both for the annual report "Findings" sections and in order to contribute to the new data reporting system relative to self-identified categories with guidance from the Evaluation Framework categories.

Second, the COV encourages Program Officers to look to experts in data aggregation to maximize the amount and quality of information that might be available through the new data recording system. We recognize that these data could be an extremely valuable resource for additional study, but we believe that it is possible that such impact may be minimized without expertise in data aggregation methods.

Finally, we suggest a funding approach, the funding of clusters of studies organized around a common theme with common data collection protocols, as an approach that may permit individual studies to have stronger generalizability and impact. This approach is proposed as one solution to fostering the greatest possible impact of research projects within a program area such as ISE. This idea is to solicit a call for proposals funded as a cluster, with one team serving as an "umbrella" study to gather and systematically study data across the subset of projects. Questions of this kind might focus on understandings the impact of information science education media on a particular topic such as evolution across a longer span of years (e.g., individual projects focusing on preschool, elementary and high school audiences using similar data collection methods organized by the umbrella team), or funding a cluster of studies comparing various approaches to reduce the achievement gap between minority and majority youth using similar data collection and evaluation methods organized by the umbrella team.

C.9 Are the ISE and ITEST programs fostering the creation of stronger collaborations?

Objective comparisons with previous levels of collaborations are difficult for the COV to make. However, it is very clear that institutional cooperation is being both encouraged and supported. Likewise, formal collaborations and informal interactions between individuals are also prevalent in the projects we reviewed. Networks such as the nanotechnology network are being encouraged. Projects like "Portal to the Public" that cross fields and disciplines and that require consistent communication and cooperation between individuals and institutions are present in the portfolio. In addition, we also note a growing interest in building collaborations within the agency itself and between ISE, ITEST and other entities within NSF. The committee feels that this is an important positive direction for the program.

C.10 Are ISE and ITEST investing appropriately to strengthen the ISE and ITEST fields going into the future? For example, ISE currently organizes the solicitation, panels, and awards by sub-sections of the ISE portfolio that include media, exhibits, citizen science, youth/community, cyber-learning, and research. Does this organizational structure allow the sub-section fields sufficient room to be creative or might it limit their project designs? How else might the project categories be organized based on the portfolio review?

The COV does not offer specific recommendations for reorganizing ISE project categories or for reorganizing the ISE group. However, we understand the need for continued discussion about this matter and support such exploration. On the one hand, there is order and continuity in maintaining the identity of current program groupings (i.e. media, cyber-learning, research, etc.). This is true internally but is also of some benefit to the community. Frequent change or uncommunicated change could certainly be confusing and detrimental. On the other hand, organizational stagnation can also be limiting and confining, especially at a time of such rapid change in the science world and in the world of informal education. This COV leans toward encouraging 1) a thoughtful continuing review of new ways to describe and organize the organization's work, 2) new and innovative ways to encourage integration of project thinking and working (to match the goal of "Innovation" in the projects awarded) and 3) providing professional development opportunities via travel funding to sustain the high energy, excitement and commitment of a hard working ISE staff. This CoV respectfully submits that success in achieving this delicate balance between necessary stability and essential change could be an important focus for the next ISE/ITEST CoV.

SIGNATURE BLOCK:

A handwritten signature in black ink, appearing to read "Christopher J. Dede". The signature is fluid and cursive, with the first name "Christopher" and last name "Dede" clearly legible.

For the ISE COV
Christopher J. Dede
Chair