

**FY 2007 REPORT TEMPLATE FOR
NSF COMMITTEES OF VISITORS (COVs)**

The table below should be completed by program staff.

Date of COV: October 16 & 17, 2006
Program/Cluster/Section: Teacher Professional Continuum
Division: Elementary Secondary and Informal Education
Directorate: Education and Human resources
Number of actions reviewed: Awards: Declinations: Other:
Total number of actions within Program/Cluster/Division during period under review: Awards: 121 Declinations: 446 Other: 23
Manner in which reviewed actions were selected: The COV was given access to all award jackets and ten percent random sample of declinations. The COV was given all declined proposals whose ID number ended in 5. The award jackets were available electronically, so additional information on specific awards was provided when requested by 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 APPLICABLE¹
<p>1. Is the review mechanism appropriate? (panels, ad hoc reviews, site visits) Comments:</p> <p>The proposal review cycle is very comprehensive and appears to lead to decisions based on expert review of the potential merits of the proposed project. The cycle involves multiple stages, beginning with the review of preliminary</p>	YES

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

<p>proposals followed by panel review of full proposals. Additional synthesis and prioritization by program officers, including a meeting by all program officers to review highly ranked proposals lead to recommendations being made to the section head and then by the division director.</p> <p>The value of the preliminary review includes both opportunities for forward planning by the NSF staff as well as capacity building within the community. The preliminary proposal and review process has the potential to encourage PIs to engage in the submission process without excessive expenditure of time and effort. PIs receive feedback that may lead to stronger future submissions. The value of the preliminary proposal is based on the assumption that it actually reflects the intended project. Interviews with program officers reveal that preliminary proposals are used as “place holders” by some proposal developers. In these cases, effort is expended reviewing project ideas that may not be further developed.</p>	
<p>2. Is the review process efficient and effective? Comments:</p> <p>The efficiency of the review process is enhanced by the electronic availability of full proposals for reviewers and electronic management of reviews and awards. Data indicate that for each of the three proposal cycles (FY 2003, 2004, 2005), the TPC program has met the dwell time goal of less than 6 months, with mean dwell times ranging from 4.94 to 5.31 months.</p> <p>Panel diversity in terms of demographics, ethnicity, gender, and content expertise helps to ensure that all proposals are examined from different perspectives, leading to reviews that highlight strengths and limitations of the many proposals submitted.</p> <p>Based on our review of the 2005 TPC November Score Report, data indicate that those proposals that are highly rated by the review panels (highest mean scores and ranking designations) are those that form the pool of proposals brought to the program officers’ review meeting. Based on examination of the available data, including score reports, dwell time report, and sampling of ejacket records, we conclude that the review process is both efficient in terms of time and effective in terms of comprehensive external reviews and use those reviews to inform the TCP funding decisions.</p>	YES
<p>3. 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? Comments:</p> <p>In this program for this period, all reviews were done by panels. Detailed examination of eight (8) individual reviews indicates that they provide proposal writers with extensive feedback about the strengths and limitations of proposed projects. The feedback addresses both intellectual merit and broader impact and</p>	Yes

<p>also focuses on project-specific activities. While the quality and quantity of feedback varies among panel members, the panel syntheses are consistently complete and helpful. In our judgment, the feedback is useful in guiding the proposal writer in ways to improve the project.</p>	
<p>4. Do the panel summaries provide sufficient information for the Principal Investigator(s) to understand the basis for the panel recommendation? Comments:</p> <p>Our detailed review of ten (10) panel summaries indicates that they consistently highlight the strengths and limitations of proposals. In most cases, the summaries provide specific information for PIs to understand the panel recommendation. However, the panel summaries may not reflect all feedback provided by individual reviewers. While the majority of panel summaries reviewed provided extensive information for PIs, some were short in details that provide PIs with insights about the panel's decision.</p> <p>Panel numerical scores and panel rankings tended to be consistent. Our review of ten (10) panel summaries and the 2005 score report from individual panel reviews indicates that high panel ratings (e.g., excellent, very good), when converted to numerical scores, tend to reflect the panel rankings. The top 3-4 proposals, mostly those receiving high rankings tended to be those recommended by the program officer for funding.</p>	<p>Yes</p>
<p>5. Is the documentation for recommendations complete, and does the program officer provide sufficient information and justification (a) for her/his recommendation? (b) for the Principal Investigator(s)? Comments:</p> <p>Sixteen eJackets were examined with primary attention given to the Review Analysis reports crafted by program officers. Of the sixteen e-jackets examined, ten were of funded proposals and six were from non-funded proposals. Our analysis considered only new proposals and did not consider proposals for supplemental funds.</p> <p>The documentation included in eJackets seems to be comprehensive for the funded proposals, but not as complete for the non-funded proposals. For example, for non-funded projects, some Review Analysis reports include only panel rating and summary of reviewer ratings with no additional program officer comments.</p> <p>Beyond the headings of intellectual merit and broader impact, there seems to be little standardization of headings and information reported across the Review Analysis reports examined. <i>It is recommended that in addition to intellectual merit and broader impact, other headings in the Review Analysis reports for all projects be standardized.</i></p> <p>The nature of the justification provided to Principal Investigators of non-funded</p>	<p>Yes</p>

proposals was not discernable because letters to these PIs were not accessible through eJacket. "Proposal Decline Letter" hot buttons are not active and result in "Eletter access failure" messages.	
6. Is the time to decision (dwell time) appropriate? Comments: Most definitely. As stated in response to Questions 2, the TPC program has met the goal of dwell time of less than 6 months, with mean dwell times ranging from 4.94 to 5.31 months for FY 2004, 2005 and 2006. This is considered a quick turn-around for a proposal submission, and is comparable to other EHR programs dwell times. Dwell time is defined as the span of time between proposal submission and Division Director's concurrence.	Yes
7. Additional comments on the quality and effectiveness of the program's use of merit review procedures: As presently organized, the preliminary proposal process can be used in unintended ways that draws resources from the system. That is, since preliminary proposals are required, some writers may submit "placeholders" that have little resemblance to a final proposal yet must be reviewed and processed with the same care given to legitimate preliminary proposals. On the other hand, the preliminary review process can provide useful feedback to proposal writers. We recommend that staff articulate the purpose of preliminary proposal submissions and review the procedures to maximize staff resources as well as to benefit the full proposals submitted.	

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 APPLICABLE²
1. Have the individual reviews (either mail or panel) addressed both merit review criteria? Yes Comments: In a random sample of 25 of the TPC proposals selected for review, virtually	Yes

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

<p>every individual review addressed both merit review criteria. Most of the reviewers appropriately evaluate the intellectual merit and broader impacts of the proposed project.</p> <p>Reviewers often used the intellectual merit section to summarize their overall judgment of the proposal, commenting on such things as the quality of the research design, treatment intervention, dissemination approach, and qualifications of the PIs, as well as to identify problematic areas in the proposed work. These considerations are all essential in determining the potential intellectual merit of the work. More than 80% of the reviews also address the criterion of the importance of the proposed activity “to advancing knowledge and understanding within its own field or across different fields.” <i>It may be helpful to encourage all reviewers to consider this point in the intellectual merit section of their reviews.</i></p> <p>With respect to broader impact, all reviews sampled did address the potential impact the proposed work could have on policy, research, theory, and practice in the field of education. Reviewers might be reminded to include potential effects for underrepresented groups.</p>	
<p>2. Have the panel summaries addressed both merit review criteria? Comments:</p> <p>In a random sample of 25 TPC proposals, virtually every panel summary addressed both merit review criteria. The panel summaries appropriately addressed the criteria and offered strong arguments supported by specific evidence in the proposals.</p>	Yes
<p>3. Have the <i>review analyses</i> (Form 7s) addressed both merit review criteria? Comments:</p> <p>In a random sample of 25 TPC proposals, virtually every review analysis addressed both merit review criteria. The analyses appropriately addressed the criteria.</p>	Yes
<p>4. Additional comments with respect to implementation of NSF’s merit review criteria:</p> <p>In the review structure it may be useful to ask reviewers to comment about positive and negative aspects of the proposed project separate from and in addition to the project’s intellectual merit. This would ensure that the importance of problems addressed would be identified as well as issues and problems that might undermine its potential contribution.</p>	

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 ³
<p>1. Did the program make use of an adequate number of reviewers? Comments:</p> <p>For review of 2003-05 preliminary proposals, there were 161, 168, and 148 reviewers, respectively.</p> <p>Between 4 and 7 individuals reviewed each full proposal. The COV agrees this seems adequate and appropriate.</p>	Yes
<p>2. Did the program make use of reviewers having appropriate expertise and/or qualifications? Comments:</p> <p>Approximately 65% of TPC reviewers between 2003-06 were academics from universities and colleges (of which roughly 1.5% were from community colleges), but many other organizations have been represented including schools and school districts (15%), and museums, independent R&D organizations, individual consultants, and professional associations (17% combined). This is a strong and diverse range of qualifications and backgrounds. Only one reviewer from the business community was included in any panel during this 3-year period.</p> <p>Information on reviewers' STEM backgrounds was available only for preliminary panel members from 2003-05. These data indicated that reviewers represented all major STEM disciplines as well as members with social science backgrounds. This combination seems well-balanced.</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?⁴ Comments:</p> <p>Reviewers of proposals varied widely in geographical location - for review of</p>	Yes

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

⁴ Please note that less than 35 percent of reviewers report their demographics last fiscal year, so the data may be limited.

<p>2003-05 preliminary proposals, reviewers were drawn from 34, 37, and 35 states, respectively. Of these, 15-20% were from Virginia and 5-8% from Washington, DC. The next most represented states were California, Massachusetts, Maryland, New York, and Texas with approximately 5% each. All regions of the U.S. were represented, along with Puerto Rico.</p> <p>Reviewers of full proposals between 2003-06 were drawn from 46 states and Puerto Rico. Approximately 14% of the reviewers were from Virginia, and roughly 5-6% from each of California, Texas, and New York. As with the preliminary proposals, all regions of the U.S. were represented. The program has done an excellent job of ensuring representation from all sections of the United States.</p> <p>The reviewers of preliminary proposals were diverse with respect to ethnicity, although approximately a third of the reviewers chose not to provide this information each year. Approximately half of the reviewers of preliminary proposals reported that they were White, approximately 13% African American, and the remaining primarily Hispanic and Asian.</p> <p>Reviewers of full proposals between 2003-06 had a similar profile—approximately 25% chose not to indicate their ethnicity; and just over 50% of the reviewers were White, 13% African American, 5% Asian, and 3% Hispanic.</p> <p>These distributions indicate that the program has done an excellent job of recruiting a varied mix of reviewers. Unlike many professional committees and panels, the profiles closely resemble the population of the country.</p>	
<p>4. Did the program recognize and resolve conflicts of interest when appropriate? Comments:</p> <p>Reviewers are directed to identify any institutions and individuals with whom they have or have had a personal or professional relationship and are asked to leave the room when any of those proposals are being discussed. This policy is carefully monitored and enforced by Program Officers during the panel review process.</p> <p>Program Officers reported that only one situation arose in which a conflict of interest could not be resolved. In this case, the one panel member with a particular area of expertise had conflicts of interest with all proposals in that area. Currently, program procedures are increasingly involving webcasts with reviewers in advance of the panel meetings, so conflicts of interest can be identified and resolved early and effectively.</p> <p>Conflicts of interest are being handled in a professional and appropriate manner.</p>	<p>Yes</p>
<p>5. Additional comments on reviewer selection:</p> <p>None</p>	

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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 style="text-align: center;">RESULTING PORTFOLIO OF AWARDS</p>	<p style="text-align: center;">APPROPRIATE, NOT APPROPRIATE⁵, OR DATA NOT AVAILABLE</p>
<p>1. Overall quality of the research and/or education projects supported by the program. Comments:</p> <p>Few of the projects were far enough along to evaluate the results of the research, publications, presentations, etc. Instead, to assess quality, the COV examined the program officer review summaries for a random sample of about 10% of the funded projects. We looked at the review of the two evaluation criteria (intellectual merit and impact) and the extent to which the PI addressed concerns raised by the panel and the program officer. The COV agrees that projects funded show promise of high quality.</p>	<p>Appropriate</p>
<p>2. Are awards appropriate in size and duration for the scope of the projects? Comments:</p> <p>Projects that were funded for longer periods and at higher levels generally correlated with a larger scope of promised activities. For NSF, a meaningful measure of the connection between size, duration and scope would be to look at the extent to which projects actually met their timelines for various activities. In looking at the TPC project evaluation planned by Abt Associates, it seems they are looking at the intended scope of activities, not at what was actually accomplished. <i>The COV recommends that Abt Associates be asked to also look at the connection between actual scope of accomplished project activities and what was promised in the original proposal.</i></p>	<p>Data not available</p>
<p>3. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Innovative/high-risk projects?⁶ <p>Comments:</p> <p>It was difficult to determine what is meant by ‘high-risk projects’ even when provided definitions by NSF program officers. However, in a review of the</p>	<p>Appropriate</p>

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

⁶ For examples and concepts of high risk and innovation, please see Appendix III, p. 66 of the Report of the Advisory Committee for GPRA Performance Assessment for FY 2005, available at <www.nsf.gov/about/performance/reports.jsp>.

<p>projects and considerations of factors such as scope, innovation and intent, approximately 16% of the projects in the portfolio would be considered innovative or of relative high risk. This proportion seems reasonable and providing an appropriate balance in the overall categories of projects funded.</p>	
<p>4. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Multidisciplinary projects? <p>Comments:</p> <p>Of the 126 TPC projects funded in three cohorts, 13 were both mathematics and science and 17 addressed all aspects of STEM. This means that 30 of the proposals, or about 25% of the total, were multidisciplinary. The COV felt this seems to be an appropriate balance.</p>	<p>Appropriate</p>
<p>5. 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>The overwhelming majority (66%) of the awards were made to individuals at various institutions of higher education (IHEs) distributed across the country. These individuals represented institutions that range from Research One universities to small community colleges. Research and dissemination centers account for approximately 34% of the awards. The research and dissemination centers include EDC, TERC and WESTED and very discipline specific organizations such as the Mathematical Sciences Research Institute at UC Berkeley.</p>	<p>Appropriate</p>
<p>6. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Awards to new investigators? <p>Comments:</p> <p>Thirty-eight of the 124 TPC funded proposals, or 31%, were awarded to PIs who had not previously received an NSF education grant. (In some cases, this was also the PI's first grant submitted; in many cases the PI had previous proposals declined.) Furthermore, half of the 38 were either full development or research study grants.</p>	<p>Appropriate</p>
<p>7. 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>Principal Investigators are to be found in 32 states across the nation. Many of the Principal Investigators are at institutions and organizations in the northeast and the southwest regions of the country, where there is a</p>	<p>Appropriate</p>

<p>concentration of universities and research and dissemination centers with the capacity and expertise to respond to the TPC.</p>	
<p>8. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Institutional types? <p>Comments:</p> <p>Over 60% of the funded proposals were awarded to universities and about 35% to other types of organizations, including independent R&D centers. The COV felt this was an appropriate balance.</p>	<p>Appropriate</p>
<p>9. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Projects that integrate research and education? <p>There is a suite of strong projects that integrate research and education. They span a range of important research categories from teacher preparation to instruction and impact on teacher and student learning to teacher retention and mentoring. Overall, they represent almost 33% of the overall portfolio.</p>	<p>Appropriate</p>
<p>10. 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:</p> <p>Regarding disciplines, about 29% of the funded projects are in mathematics, 47% in science, 24% are interdisciplinary (math and science, or STEM). This seems to be reasonable balance. (Note that question four and ten were addressed by different panel members and the percentages are almost identical.) Regarding sub disciplines, few of the projects focus just on a single science (like physics or chemistry or biology or earth science). A better indication of balance would be to look at the distribution of issues that are the focus of projects. For science projects, 17% focused on impact, 14% on instruction, and 10% on equity. For math projects, 21% focused on instruction, 21% on teacher learning, 18% on resources and 12% on impact. For the STEM projects, 17% focused on equity, 17% on assessment, 12% on retention and 12% on partnerships. The COV noted that the balance across issues differed across disciplines, but did not decide what this difference indicates.</p> <p>In its mission and goals, the TPC program does not seem to lend itself to projects focusing on emerging technologies. Indeed, there seem to be very few projects taking advantage of emerging technologies. The COV found three: 1) a proof of concept project promoting and investigating teachers' use of digital libraries in classrooms (0554440); 2) a proof of concept project investigating Internet2 as resource for PD for middle school teachers (0455784); and 3) full research project investigating how teachers use full</p>	<p>Appropriate</p>

<p>wireless environment in high schools (0455795). In its mission and goals, the TPC program doesn't seem to lend itself to projects focusing on other emerging opportunities.</p>	
<p>11. Does the program portfolio have appropriate participation of underrepresented groups? Comments:</p> <p>There are a significant number of projects that are focused on the participation of underrepresented groups. These projects include conferences focused on Diversity and Learning, children and rural education, development of tools for teachers of special needs students, English learners and American Indian Students and projects that focus on professional development of teachers of underrepresented and underserved students. A review of the proposals indicate that a high percentage of proposals indicate a large number of participants that teach underrepresented students regardless of the explicit work proposed.</p>	<p>Appropriate</p>
<p>12. Is the program relevant to national priorities, agency mission, relevant fields and other customer needs? Include citations of relevant external reports. Comments:</p> <p>The TPC grew out of other NSF sponsored programs and focuses on the need for a better understanding of how to help individuals become quality teachers of PreK-12 STEM and the resources needed to support the initial and ongoing professional development of such teachers. The need for highly qualified teachers is a feature of the No Child Left Behind legislation, the several reports from the National commission on Education and America's Future and the report from the Glenn Commission. The program officers clearly were conscious of these reports. Since 2003, the initiation of TPC, there have been at least 14 reports from organizations such as the Business-Higher Education Forum and the Business Roundtable that address issues in STEM teaching and learning that include sections on teacher professional development. (For a report of a conference that reviewed these reports with conference recommendations see, <i>The Natural Selection</i>, Spring 2006, BSCS, Colorado Springs, CO.) The TPC program anticipated these as well as more recent reports that were published as the program was functioning. Three recent reports include <i>Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future</i> and the forthcoming, <i>Taking Science to School, Learning and Teaching Science in Grades K-8</i> from the National Academies of Science (NAS) and the federal American Competitiveness Initiative.</p>	<p>Appropriate</p>
<p>13. Additional comments on the quality of the projects or the balance of the portfolio:</p>	

None

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

1. Management of the program.

Comments:

The Teacher Professional Continuum (TPC) program in the Education and Human Resources Directorate is jointly managed by the Division of Elementary, Secondary, and Informal Education (ESIE) and the Division of Undergraduate Education (DUE). The TPC program began with its first solicitation in 2003. The program is the result of the merging of two existing programs: the Teacher Education Program located in EISI and CETP located in DUE. The TPC program will end in 2007 as it is merged into Discovery Research K-12. During the time the program was in design and operation, it was managed by seven section heads (one of which was in reality a team of four), six division directors, and 29 program officers. In addition, the program management is supported by a contract with Abt Associates, Inc. and two grants to EDC.

While turnover is a hallmark of NSF, constantly infusing the organization with ideas 'from the field', the amount of turnover for this program seems exceptionally high. Given this variability in leadership and consequent management, the comments to Questions A.1 to A.4 above are indicators of successful management. As also noted earlier, dwell time was well within the 6-month goal. Abt Associates is working on and has promised a review of the scope of work, but their final product was not available at the time of the COV. It is noted that they had missed two deadlines for interim reports, although by small amounts of time. EDC provided meetings for potential PIs, especially from institutions with large numbers of people from underserved populations. It could be inferred that this advance work increased the diversity in the proposals. Some of the efforts by EDC will be carried forward into the DRK-12 Program.

Another way to evaluate the management of a program is to compare the accomplishments of that program with the goals. Immediately below is a statement of the Mission, Goals, Objectives and Strategies of the TPC Program. A review of parts of almost all the funded proposals indicates that the program funded projects that were aligned with the strategies. Under each strategy is a statement of how the program supported the strategy.

- **Mission:** Funded projects fall within the three pronged emphasis outlined in the program mission:
 - Educational research
 - Development of resources
 - Development of infrastructure
- **Goal:** To eliminate disconnect between teacher preparation and teaching practice
- **Objective:** To support investigation of the critical issues and needs surrounding the recruitment, preparation, enhancement, and retention of STEM teachers for grades K-12 by (see subheadings under Strategies).

- Strategies

- a) ***Advancing the knowledge base on the preparation, induction, enhancement, and retention of STEM teachers, and on the strategies that strengthen and diversify the STEM teaching workforce.***

An examination of funded proposals shows support for proposals that (1) identify pivotal experiences of career science and/or mathematics teachers that have promoted their advancement along the TPC, (2) identify effective professional development models and experiences that advance the knowledge base and enhance teacher effectiveness, (3) investigate the impact of “importance of teacher quality” on student success, (4) investigate the impact of teacher turnover as a critical issue facing schools, and (5) the impact of “induction into learning” on giving new teachers a strong start.

- b) ***Promoting scientifically based research that examines teacher learning of STEM content and pedagogy, and assesses the subsequent impact of this learning on practice***

An examination of funded proposals shows support for proposals that (1) develop and test delivery systems for deploying effective professional development for teachers from high need schools and evaluating the transfer of teacher learning into practice, (2) develop enhanced curriculum models and training of teacher-leaders that will present the models to fellow teachers.

- c) ***Encouraging research on effective professional development models and experiences that enhance STEM teachers' pedagogical content knowledge and its alignment with classroom practice***

An examination of funded proposals shows support for proposals that explore the role of “discourse” in the development of student understanding by testing and modifying instruments used in evaluating patterns of teacher-student discourse. Funded proposals have sought to develop, implement, and evaluate strategies for improving the frequency and conceptual richness of the teacher-student discourse and the factors affecting learning of content by teachers and the conceptualization of student learning. Contribution to the knowledge base

- d) ***Understanding, through research, those instructional practices that enhance student learning in STEM disciplines***

An examination of funded proposals shows support for proposals that investigate the impact of content mentoring by university STEM professionals to improve the knowledge, skills, dispositions, and overall ability of teachers to effectively facilitate student learning and achievement.

- e) ***Developing innovative resources, materials, tools, and ideas, for preparing and supporting STEM teachers and those who educate them***

An examination of funded proposals shows support for proposals that seek to (1) promote the exchange of research-based knowledge and awareness of “best practices” in STEM education by strengthening the communication links and information flow between researchers and teaching practitioners and (2) develop

resources in the way of training manuals and web-based teaching resources that include research protocols, analysis tools, science inquiry and modeling activities for use by teachers.

f) *Fostering effective collaborations between the communities of STEM K-12 teachers, STEM researchers, practitioners, and others contributing to STEM education*

An examination of funded proposals shows support for proposals that seek to form partnerships between (1) preservice STEM teachers and centers of informal STEM education for the purpose of fostering the development and refinement of science teaching and learning skills, (2) universities and STEM industries for the purpose of developing, field-testing, and evaluating professional development modules, and (3) university colleges (education and STEM) and school divisions for the purpose of developing curriculum resources to aid in the implementation of problem-based instruction in STEM classrooms.

g) *Disseminating research findings, effective models, and field-tested resources to national audiences of practitioners, administrators, researchers, policy makers, education faculty, and/or STEM disciplinary faculty*

An examination of funded proposals shows support for proposals that seek to disseminate finds through the submission of articles to professional journals and educational publications and through presentations at local, state, and national meetings.

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

Comments:

The very name of the program, Teacher Professional Continuum, indicates that support of the professional development of teachers is paramount. The solicitation called for proposals that conducted research on points on the Continuum and on resources for teacher professional development. The requirements for proposals presented in the solicitation emphasize the importance of research studies that build on existing research and the integration of research and education. Indicators of success in the quality and quantity of educational opportunities afforded to teachers include support for projects that seek to increase knowledge in both content and pedagogy, improve the effectiveness of instruction, and foster subsequent learning by teachers at various stages in their PD continuum and their students.

In addition, the citations used in the introduction to the TPC program across the three solicitations, changed substantially showing responsiveness to emerging as well as well-established research.

Finally, in the regular revision of the solicitation for TPC, the program anticipated some of the subsequent policy documents such as Rising Above the Gathering Storm, The American Competitiveness Initiative and the recent report, Taking Science to School, Learning and teaching Science in Grades 1-8, on learning progressions.

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

Comments:

One indicator of the planning and prioritization of the programs in the portfolio is the change in the solicitation. During the first year, three types of projects were sought:

- (1) research studies on the critical issues/needs outlined in the solicitations including the recruitment, preparation, support, induction, and retention of K-12 STEM teachers;
- (2) the development of professional resources grounded in current research on teaching and learning that address the recognized national need for quality teachers and advance the knowledge base on STEM teaching; and
- (3) the planning and implementation of conferences/symposia intended to assemble experts to introduce, discuss, and/or synthesize research related to the recruitment, preparation, development or retention of K-12 STEM teachers, present and discuss professional resources for K-12 STEM teachers, and to review and develop action plans for future research and resource development projects.

During the second solicitation, two additional types of projects were sought. The exploratory studies were added to the research studies and proof of concept studies were added to the professional resources studies. During the final year, the development and testing of models was added to the research studies.

Funding priorities evidenced across the current portfolio follow a logical progression that commences with a foundation of research (57 projects), and progresses to include the development of resources (39 projects), and provided avenues for the gathering and dissemination of expertise (26 projects).

A range of grade levels impacted by projects are evidenced as well as variety in terms of discipline, represented groups, and other factors.

4. Additional comments on program management:

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:

Diversity. There are a number of ways that the TPC Program addressed the NSF Goal for developing people. Nine percent of the new PIs (of those reporting ethnicity (25% decline to report)) are from underrepresented groups. Many projects are designed to impact diverse groups (11 proposals identify service to underrepresented groups as a primary goal). Another large percentage of projects impact students from the underrepresented groups, as the COV inferred from the locations.

Well-prepared citizens. Technology projects are developing potential technologists and well prepared citizens – those that become comfortable with the use and integration of technology in

daily life. It is not always clear what NSF and EHR mean by technology – technology education, educational technology, technology in the service of science or careers in technologies that impact the quality of human life (the new vocational education). This later career technology education should not be lost among the many other variations of technology as such approaches to technology are important to the economy of communities.

Well-prepared citizens. The COV also noted above that the projects funded by TPC are young and do not as yet report evidence or a positive impact on students.

Work force. Projects that focus on retention in the K-12 STEM teaching workforce are included in the portfolio.

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

Among the 122 projects, several very important themes are evidenced: equity, instruction, teacher knowledge, and retention. The TPC allowed for the “trying of new ideas”. For example the planning and implementation of two conferences on mathematics and science specialists (elementary school-based individuals with disciplinary and pedagogical expertise to support other teachers and students) and the production of journals and/or conference proceedings for use in the dissemination of information gathered at the meetings.

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.”

All TPC proposals address outcome. Especially noteworthy are those listed as developing models of professional development and those that provide “proof of concept” on professional development.

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.”⁷

The merit review system is credible in that proposal review and evaluation includes a cross section of shareholders – professional researchers, university/college representatives, and representatives from school divisions including instructional supervisors, school based program managers, and teachers. In a similar manner the program review by COVs is evidence of best practices in business.

NSF has increasingly used electronic media for proposal submission, review and now record maintenance. There also is a proposal for panelist meetings via web casting to identify and eliminate of conflicts of interest. Both are examples of efficient and effective practice.

⁷ For examples and further detail on the Organizational Excellence Goal, please refer to pp. 19-21 of NSF’s Strategic Plan, FY 2003-2008, at <http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf04201>. Please note that there will be a new Strategic Plan in FY 2007.

PART C. OTHER TOPICS

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

The TPC Program was short-lived, emerging from previously identified needs and merging into a new organizational structure after a mere three years. It would be useful if a future COV could review what actually happened as a result of the funded projects and their effectiveness, as this information was not available to this COV.

It would be important for NSF/EHR to fund some follow-up studies to determine if the projects actually did what they promised and what could be learned from the project that has wider application to PreK-12 STEM teaching and learning.

Most of the projects funded use typical modes of dissemination – articles, websites, and conference presentations. It would be useful if NSF could sponsor some additional ways to disseminate the new knowledge and resources produced by TPC. This is especially true of the more recent projects which are developing models of teacher preparation and ongoing professional development and of resources for professional development.

While current proposals require PI's to list current funding and results of previous funding and to include an introduction that focuses on existing knowledge, this COV feels that PIs should be required to check what materials are already available (produced by previous funding by NSF and other sources) and to detail how their work is different from or builds on that of other researchers and developers.

As would be expected, the members of this COV have participated in other NSF activities as awardees and reviewers. We believe that there is much high quality knowledge and many resources that do not become well-known to the many stakeholders in PreK-12 STEM education and would urge NSF to consider ways that they, not just PI's, could disseminate information.

We also believe that NSF is the proper venue to support studies of PreK-12 STEM teaching and learning and urge NSF to consider ways to support cross project studies, similar to meta-analyses.

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.

From the solicitation, and the increased precision of focus in the solicitation, it is clear that the TPC provided funding for research and resources at specific points on the STEM Teacher Professional Development Continuum but not the continuum as an entity. The members of the COV wonder if a review of the TPC Projects (and some the precursors) might begin to trace the placement of these points and the connections between them. This could lead to the development of teacher learning trajectories, similar to work being done to trace student learning trajectories. Several projects address a learning progression but do not link to other programs on learning progressions that NSF has funded.

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

The COV recognizes the attempts by NSF to balance stability of personnel and the regular introduction of fresh ideas that come with rotating personnel. This program seems to have an exceptionally high degree of changing personnel.

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

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

The report template should be reviewed for clarity. The COV understand the reality of a Foundation-wide template, but some questions seem to be inappropriate for the education projects – research, knowledge development and resource development. Program specific clarification, such as in this case what would constitute a high-risk project, made available prior to commencement of the meeting would be helpful.

This COV understands that we were the first in EHR to do a review using the electronic jackets and database. The TPC Program staff provided us with much information and access to these materials well ahead of time. However, the ejacket and database were new to us and we had a steep learning curve to develop ease and precision of use. This learning curve will likely decrease as more people use the ejacket and database. A web conference with COV and Program Officers would have been helpful along with instructions from the COV chair (assignments, focus areas, etc.) Given human nature, despite all the information in advance, many of us did not delve into the task until immediately before the meeting convened. A web conference might have forced earlier engagement. Similarly, a conference call might have been useful, but only if COV members were at a computer to access the database.

As more people use the ejackets and database, there will be increased demands for ways to search and manipulate and search manipulate database. Ease of access will lead to more specific requests. For example, as has been done with paper jackets, 10% of the declined proposals were available, but some COV members wanted more. In the future, those who are used to working in large databases will want to do more and may want the database to be similar to the one with which they are familiar. Those with less experience may want a way to simplify the database, possibly by converting it to a spreadsheet.

It is our sense that we did more numerical analysis because we had access to the database. We also believe we looked at more jackets than we would have had there been paper jackets. However, this increased access made searching more difficult. We puzzled on how we could get information on specific types of projects (innovative, high-risk, multidisciplinary (Questions A.4 #3 & #4) other than asking program officers for suggestions which would have introduced bias.

SIGNATURE BLOCK:



For the Teacher Professional Continuum COV

Angelo Collins
Chair

MEMORANDUM

DATE: May 15, 2007

TO: Bernice Anderson, Senior Program Director for Evaluation
Directorate for Education and Human Resources

FROM: Glenn Markle, Program Director, Elementary, Secondary & Informal Education

SUBJECT: COV For Teacher Professional Continuum (TPC)

The Committee of Visitors report for the TPC Program was approved at the EHR Advisory Committee meeting held at NSF on May 1-2, 2007. The COV consisted of 7 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.....	.....1.....
Institution Type:	
<input type="checkbox"/> University.....	.....4.....
<input type="checkbox"/> Four-year College.....	.....0.....
<input type="checkbox"/> Two-year College.....	.....0.....
<input type="checkbox"/> K-12 School or LEA.....	.....1.....
<input type="checkbox"/> Industry.....	.....2.....
<input type="checkbox"/> Federal Agency.....	.....
Location	
<input type="checkbox"/> East.....	.....2.....
<input type="checkbox"/> Midwest/North .....	.....1.....
<input type="checkbox"/> West.....	.....2.....
<input type="checkbox"/> South.....	.....2.....
Gender	
<input type="checkbox"/> Female.....	.....5.....
<input type="checkbox"/> Male.....	.....2.....
Race/Ethnicity	
<input type="checkbox"/> White.....	.....5.....
<input type="checkbox"/> Black.....	.....1.....
<input type="checkbox"/> Hispanic.....	.....1.....
<input type="checkbox"/> Asian/Pacific Islander.....	.....
<input type="checkbox"/> Native American.....	.....

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.')