

THE QUALITY EDUCATION FOR MINORITIES (QEM) NETWORK

**REPORT ON THE
DECEMBER 4-5, 2009 FOLLOW-UP WORKSHOP
TO THE SEPTEMBER 2009 STEM OUTREACH FORUM
FOR HISPANIC-SERVING INSTITUTIONS (HSIs)**

The Quality Education for Minorities (QEM) Network
Report on the
December 4-5, 2009 Follow-up Workshop to the
September 2009 STEM Outreach Forum for Hispanic-serving Institutions

OVERVIEW

On December 4-5, 2009, the Quality Education for Minorities (QEM) Network conducted a follow-up workshop to the September 2009 Outreach Forum held for science, technology, engineering, and mathematics (STEM) faculty from Hispanic-serving Institutions (HSIs). Both the Outreach Forum and the follow-up workshop were supported by grants to the QEM Network from the National Science Foundation (NSF).

The purpose of the Outreach Forum was to provide information and gather input from STEM faculty at HSIs regarding program components and requirements for a proposed NSF HSI-STEM initiative focused on STEM education and research capacity building at HSIs. The purpose of the follow-up workshop was to provide STEM faculty from an expanded group of HSIs with information on existing NSF programs that offer support in several of the areas of critical need identified by the Forum participants. The follow-up workshop enabled participants to meet face-to-face with NSF Program Officers and staff who provided detailed information on selected NSF programs; responded to questions about the programs; and offered feedback to participants on their preliminary ideas for proposals to these and other NSF programs.

One hundred twenty-two (122) faculty from 62 Hispanic-serving Institutions (35 four-year and 27 two-year institutions), attended the follow-up workshop. The follow-up workshop included both plenary and concurrent sessions on existing NSF programs that were led by NSF staff. The discussions involved the participation of 14 NSF Program Officers or staff and enabled faculty from HSIs to interact face-to-face with NSF officials regarding funding opportunities and related proposal ideas.

The NSF programs on which the follow-up workshop sessions focused were selected following an analysis by NSF and QEM staff of the areas identified by the Outreach Forum participants as critical to significantly enhancing their institutions' STEM research and education capacity. NSF panelists provided an overview of existing programs within their purview that might address one or more of the broad categories of needs identified by the Forum participants (Student Support, Faculty Development, STEM Curricula Enhancement, Partnerships, and Laboratory Improvement). Session highlights are provided in the overview of the agenda that is provided in the last section of this report.

Participants in the follow-up workshop also had an opportunity during the workshop's closing plenary session to discuss STEM needs at HSIs they felt were unmet by current NSF programs and that might be addressed through the proposed NSF HSI initiative. Among the areas participants felt were within NSF's purview but not addressed by existing NSF programs were the following:

- STEM Research at Two-Year Colleges
- New Research Facilities
- Expansion of STEM Capacity-Building Efforts
- Institutional Evaluation and Assessment Capacity
- Mentoring and Guidance Counselors for Potential STEM Students
- Pedagogy for STEM Faculty
- Scholarships for Special Groups and High School Dropouts Who Receive the GED
- Proposal Submission and NSF's Broadening Participation Portfolio

Details on the discussion of each of these topics are provided later in this report.

BACKGROUND

The September 2009 Outreach Forum was designed to gather feedback on a potential NSF initiative for building STEM research and education capacity at HSIs. The Forum's overall goal was to assist the Human Resource Division (HRD) of NSF's Directorate for Education and Human Resources (EHR) in gathering broadly representative, informed, and comprehensive input regarding essential program components and requirements for a potential NSF STEM initiative focused on HSIs. Forum sessions were designed to: 1) Identify critical needs in STEM undergraduate education and research at HSIs; and 2) Ensure that faculty at HSIs had an opportunity to inform the development of an NSF STEM education and research capacity-building program to address institutional needs.

A total of 144 STEM faculty members representing 69 HSIs (32 two-year and 37 four-year institutions) participated in the Outreach Forum. The 69 participating institutions were from nine (9) states and the Commonwealth of Puerto Rico. The states were Arizona, California, Colorado, Florida, Illinois, New Jersey, New Mexico, New York, and Texas. Forty-two (42) or 61 percent of the institutions represented were from California or Texas. Forum participants were asked to provide written comments to QEM, prior to and during the Forum, on what they and their campus colleagues considered to be critical areas for an NSF STEM initiative focused on HSIs as well as potential program features (e.g., design, institutional eligibility, award duration, and support options).

QEM staff examined the prior written feedback as well as the input gathered from the participants during the two-day Outreach Forum through plenary sessions and smaller concurrent breakout sessions. While some commonality and differences existed among the input from participant groups, the identified critical needs generally fell under the following areas: Student Support; Faculty Support; STEM Curricula Enhancement; Integration of Research and Education; Partnerships; and Laboratory Space, Instrumentation, and Equipment. Based on feedback from Forum sessions, many of the participants were unaware of existing programs at NSF from which they could seek support for meeting critical needs.

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SUMMARY OF THE GROUP DISCUSSION AT THE FOLLOW-UP WORKSHOP OF CRITICAL NEEDS WITHIN NSF'S PURVIEW BUT NOT ADDRESSED BY EXISTING NSF PROGRAMS

As noted in the Overview above, the closing plenary session of the follow-up workshop provided an additional opportunity for group discussion of critical STEM-related needs at participating institutions that participants felt were within NSF's purview but were not addressed by existing NSF programs. The topics discussed below are presented in the order raised by participants during the closing session.

New Facilities

While the construction of new facilities is generally not within NSF's purview, participants expressed a need for new facilities at HSIs in response to an increase in enrollment. Federal programs identified that might address such needs included the National Institute of Standards and Technology (NIST) grants for the construction of science research buildings and infrastructure development support available through the Economic Development Administration at the U.S. Department of Commerce. Funds for these opportunities were made available through the American Recovery and Reinvestment Act (ARRA) of 2009.

Expansion of STEM Capacity-Building

Participants described a major problem resulting from increased student enrollment at their institutions. Due to budget cuts, some institutions must reduce the number of classes offered. These circumstances make it unlikely that these institutions will be able to expand their STEM capacity-building efforts without external support.

Institutional Evaluation and Assessment Capacity

Participants expressed the need to build institutional capacity in evaluation and assessment at minority-serving institutions. It was stated that to build this capacity and facilitate project sustainability, the new HSI initiative should provide for faculty training in evaluation and assessment.

Mentoring

Participants suggested that the initiative should include a faculty development emphasis on mentoring techniques. Some expressed the need for a formal mentoring program for faculty who mentor STEM or potential STEM students. Also, it was suggested that faculty should train students to be peer mentors.

Pedagogy

A need was expressed to have the initiative include faculty professional development in pedagogy by STEM discipline. Dr. Kathleen Bergin, an NSF Program Director, mentioned that support for faculty development in pedagogy is allowed in several existing NSF programs, including Advanced Technological Education (ATE) and the Science, Technology, Engineering, and Mathematics Talent Expansion Program (STEP).

Guidance Counselors

Participants suggested that special training should be provided, as appropriate, for high school guidance counselors who advise students on which STEM courses to take as well as on the requirements and opportunities for students who wish to pursue STEM-related careers and degrees. It was pointed out that some guidance counselors steer students away from the pursuit of STEM-related careers.

Scholarships for Special Groups

Participants discussed the possibility of providing scholarships to students with families, including single parents, who would like to return to college in pursuit of STEM-related degrees. Dr. Bergin indicated that NSF's S-STEM program provides scholarships for STEM students. QEM consultant, Dr. Carlos Rodriguez, noted that the U.S. Department of Education has a program that provides support to returning veterans.

High School Dropouts Who Later Receive the GED

Some of the discussion focused on the possibility of targeting high school dropouts who later receive the GED as a source of potential candidates for STEM-focused degrees. None of the NSF program directors recalled any NSF award that focused on GED students. The discussion did not offer any suggestions regarding how potential student participants in such a program would be identified.

STEM Research at Two-year Colleges

It was stated that the majority of Hispanic students are in two-year colleges and that, in general, two-year college faculty are not engaged in STEM-related research activities. A question was raised regarding existing NSF support activities available to two-year college faculty for research efforts. Participants were reminded that two-year college faculty could engage in research with an NSF grantee via a Research Opportunity Award (ROA) supplement to a Principal Investigator's research award.

Participants stated that two-year colleges could not compete with four-year colleges in a number of NSF-funded programs. They also expressed the need to recognize the existence of an emerging role for two-year colleges that goes beyond the services they originally were established to provide. Participants said further that NSF needed to understand the cultural differences between two-year and four-year colleges.

For example, it was pointed out that it is difficult for two-year college faculty researchers to make connections between what they do in the classroom and what they do in research outside the classroom. One participant commented that 75 percent of two-year college faculty hold adjunct positions and, therefore, have little time for proposal writing or mentoring activities. Participants suggested that NSF should examine existing barriers to providing support for two-year colleges.

Participants were informed that the National Science Board, the Presidentially-appointed policy-making and oversight body for NSF, plans to discuss NSF's support of two-year colleges as a major issue in upcoming months.

Proposal Submission

Participants commented that faculty at two-year institutions have significant course teaching loads (e.g., five courses per semester), as well as associated faculty responsibilities. As a result, proposal development would be very difficult. QEM Consultant Dr. Arturo Bronson, Professor of Mechanical Engineering at University of Texas at El Paso, commented on the frustration he sensed among the participants of a lack of time for faculty to engage in non-teaching activities.

He observed that STEM faculty at Tribal Colleges and Universities (TCUs) and Historically Black Colleges and Universities (HBCUs) also have identified lack of time for proposal development as an issue. Dr. Bronson urged the participants to “get upset” enough to drive themselves toward writing proposals to existing NSF programs. He suggested they should push NSF with good ideas. He also said that faculty should work jointly within and outside their institutions on proposals to enhance STEM education.

NSF Broadening Participation Portfolio

Questions were raised by participants as to whether certain NSF programs excluded two-year colleges from submitting proposals. A review by QEM of the NSF Broadening Participation Portfolio, following the workshop, identified at least three NSF programs that explicitly exclude or limit the participation of two-year colleges and some four-year colleges from submitting proposals. These programs are:

- NSF Graduate Teaching Fellows in K-12 Education (GK-12): Proposals may be submitted by academic institutions in the United States and its territories that grant master’s or doctoral degrees in STEM disciplines supported by the National Science Foundation.
- Partnerships for Research and Education in Materials (PREM): Two-year Associate degree-granting colleges are not eligible to submit a proposal under this solicitation, except where an established degree-granting partnership exists between a two-year (Associate degree-granting) and a four-year institution.
- Partnerships in International Research and Education (PIRE): Proposals may be submitted by universities that have granted one (1) or more Ph.D. degrees in a science or engineering field since January 1, 2006, that are accredited in, and have a campus located in the U.S.

Recommendations from Participants Regarding Two-Year Institutions

1. An area that needs further exploration is the extent to which STEM faculty at two-year institutions are able to obtain research support from NSF.
2. In designing new HSI initiatives, NSF should review the success rates of MSIs in general, and two-year HSIs in particular, in programs such as Advanced Technological Education (ATE), Course, Curriculum, and Laboratory Improvement (CCLI), and STEM Talent Expansion Program (STEP).
3. Two-year institutions should have greater opportunities to serve as the lead institution on proposed partnerships with four-year/research institutions seeking NSF support.
4. NSF should explicitly re-align its eligibility criteria across all its programs to be more inclusive of two- and four-year institutions.

FOLLOW-UP WORKSHOP AGENDA: OVERVIEW AND ADDITIONAL HIGHLIGHTS

Following the welcome and introductions of participants, an update was provided on the September Forum Report prepared by QEM. A series of plenary session panels were conducted by NSF program directors. The panels on Day One focused on the following topics: *NSF's Broadening Participation Portfolio: A Closer Look at the Critical Needs/Priority Areas in STEM Identified at the Forum that Could Be Addressed by Existing NSF Programs*; and *NSF Cross-Directorate Programs*.

NSF staff provided an overview of existing programs within their respective divisions that may address one or more of the broad categories of needs identified by the Forum participants. A panel of NSF program directors from research directorates (Biological Sciences, Engineering, and Mathematical and Physical Sciences) discussed Research Experiences for Undergraduates (REU) and Broadening Participation Initiatives within each Directorate. This panel was followed at lunch by a discussion of NSF Panel/Ad Hoc Review and Rotator Opportunities.

Four concurrent sessions were offered during Friday, Day One, and repeated on Saturday, Day Two. These sessions were led or co-led by NSF Program Directors or staff and focused on *Identifying Funding Sources for STEM Projects—A Closer Look at Existing NSF Programs, by Division*. The sessions, outlined below, provided an opportunity for participants to get feedback on their proposal ideas for selected NSF programs.

Dr. Parag Chitnis, Deputy Division Director, Division of Molecular and Cellular Biosciences, in the Directorate for Biological Sciences, gave a presentation on “Tips and Techniques in Proposal Preparation.” He provided an overview of NSF funding opportunities through both solicited and unsolicited research proposals. Dr. Chitnis emphasized that NSF invests in the best ideas from the most capable people as determined by competitive merit review. He noted that the Foundation’s proposal review criteria consisted of Intellectual Merit and Broader Impacts.

According to Dr. Chitnis, highly competitive proposals have cutting-edge ideas, are sent to the right program within the Foundation, and are well-written. He said that proposers should make the reviewers’ job easy by writing proposals that are accurate, concise, logical, and clear. He identified several reasons a proposal might not be funded. These reasons included an overly ambitious research plan; a lack of access to the resources and facilities needed; and proposed methods and plans that do not address the stated research goals.

Dr. Fae Korsmo, Senior Advisor, Office of the Director, NSF, gave an overview of potential funding opportunities within NSF’s Broadening Participation Portfolio. In discussing the general mission of NSF, she remarked that NSF:

- Supports extramural scientific research;
- Supports education and training at all levels;
- Supports strategies to cultivate a world-class STEM workforce for the U.S.; and
- Promotes public understanding of STEM.

Dr. Korsmo described a number of NSF funding opportunities designed to broaden participation at the undergraduate level. These opportunities include Advanced Technological Education (ATE); Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM); Course, Curriculum, and Laboratory Improvement (CCLI); Science, Technology, Engineering, and Mathematics Talent Expansion Program (STEP); Math and Science Partnerships (MSP); and Robert Noyce Teacher Scholarships.

Education and Human Resources (EHR) Directorate

Division of Human Resource Development (HRD)

Discussion Leaders: Dr. James Wyche, HRD Division Director, NSF; and Mr. Michael Fredenberg, Program Director, NSF

NSF Programs Discussed:

- ADVANCE (Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers)
- Research on Gender in Science and Engineering (GSE)
- LSAMP (Louis Stokes Alliance for Minority Participation)
- Innovation through Institutional Integration (I-cubed) Initiative (Cross-cutting effort)
- Research on Disabilities in Education (RDE)

Division of Undergraduate Education (DUE)

Discussion Leaders: Dr. Elizabeth VanderPutten, Program Director, NSF; and Dr. Kathleen Bergin, Program Director, NSF

NSF Programs Discussed:

- Math and Science Partnership Program (MSP)
- Course, Curriculum, and Laboratory Improvement (CCLI)
- National Science, Technology, Engineering, and Mathematics Education Digital Library (NSDL)
- Science, Technology, Engineering, and Mathematics Talent Expansion Program (STEP)
- Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM)
- Advanced Technological Education (ATE)
- Robert T. Noyce Teacher Scholarship Program

Division of Graduate Education (DGE)

Discussion Leader: Dr. Sandra Alcalá-Barraza, Congressional Hispanic Caucus Institute Fellow, NSF

NSF Programs Discussed:

- Graduate Research Fellowship Program (GRFP)
- Integrative Graduate Education and Research Traineeship Program (IGERT)
- NSF Graduate STEM Fellows in K-12 Education (GK-12)
- Science Master's Program (SMP)

Division of Research on Learning in Formal and Informal Settings

Discussion Leader: Dr. Julia Clark, Program Director, NSF

NSF Programs Discussed:

- Informal Science Education (ISE)
- Discovery Research K-12 (DR-K12)
- Innovative Technology Experiences for Students and Teachers (ITEST)

Research Directorates and Cross-Directorate Programs

The following Program Directors led discussions of proposal ideas for initiatives within their respective Research Directorates:

Dr. Sally O'Connor, Program Director, Directorate for the Biological Sciences, NSF

Dr. Tyrone Mitchell, Program Director, Division of Chemistry
Directorate for Mathematical and Physical Sciences, NSF

Dr. Omnia El-Hakim, Program Director for Diversity and Outreach
Office of the Assistant Director, Directorate for Engineering, NSF

The following NSF Cross-Directorate Programs within the Office of Integrative Activities (OIA) were discussed by Dr. Myra Montrose, Science Policy Analyst, OIA and Dr. Elizabeth VanderPutten, Program Director, NSF:

- Major Research Instrumentation (MRI)
- Faculty Early Career Development (CAREER)
- Experimental Program to Stimulate Competitive Research (EPSCoR)

**Remarks by Dr. Wanda Ward, Acting Assistant Director
Education and Human Resources (EHR) Directorate, NSF**

Dr. Ward discussed the mission and goals of EHR and how they relate to Hispanic-serving Institutions. She stated that the EHR mission was to “Build a diverse and well-prepared workforce for the 21st Century” and its goals are to:

- Prepare the next generation of STEM professionals
- Promote STEM education research and evaluation
- Broaden participation in STEM
- Increase the Nation’s technological, scientific, and quantitative literacy

Dr. Ward provided participants with a thematic framework for education coordination. The framework consisted of Broadening Participation to Improve Workforce Development; Enriching the Education of STEM Teachers; Furthering Public Understanding of Science and Advancing STEM Literacy; Fostering Cyber-learning to Enhance STEM Education; Promoting Learning Through Research and Evaluation; and Advancing Career Development Opportunities.

Dr. Ward noted that Hispanic Americans are among the fastest growing population groups in the United States and are 15 percent of the U.S. population, 19 percent of school age population, and 18 percent of college age population. She stated that EHR manages more than half of NSF's programmatic efforts to broaden participation in STEM research and education. Dr. Ward provided several examples of EHR projects that focus on Hispanic populations, including the following:

- An ATE award to Mount San Antonio College on "Regional Information Systems Security"
- An ITEST award to California State University, San Marcos on "IQUEST: Investigations for Quality Understanding and Engagement for Students and Teachers"
- A STEP award to the University of Southern California on "Pathways to STEM Bachelor's and Graduate Degrees for Hispanic Students and the Role of Hispanic-serving Institutions"

Dr. Ward also discussed the role that two-year colleges play in education. She stated that two-year colleges represent the largest single sector of higher education, enrolling more than 6 million students for credit courses (another 5 million for non-credit courses). Dr. Ward provided the following statistics on enrollment of students in two-year colleges. The colleges enroll 46 percent of all U.S. undergraduates and:

- 55 percent of Hispanic Students
- 46 percent of African American Students
- 46 percent of Asian or Pacific Islander Students
- 55 percent of Native American Students
- 39 percent of First Generation to Attend College Students

Additional Sessions

Discussion of Post-Award Activities and Conditions

Ms. Pamela Hawkins, EHR Team Leader, NSF Division of Grants and Agreements, Office of Budget, Finance, and Award Management, discussed Post-Award Conditions and Requirements, Project Monitoring, and Oversight. She emphasized the importance of being knowledgeable about Federal requirements regarding the handling of grants and agreements.

FastLane Session

Ms. Evelyn Baisey-Thomas, Computer and Information Specialist, Office of Information and Resource Management, NSF (Retired) presented information to the group on how to use the NSF *FastLane* System for submission of proposals and annual and final reports.

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