

*Overview of the National Science Foundation*  
Quality Education for Minorities (QEM) Network Workshop for the  
National Science Foundation's Faculty Early Career

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**SLIDE 1 Title Slide**

Good morning. It is indeed a pleasure to be with you today to not only provide you with an overview of the National Science Foundation, but to celebrate your accomplishments as part of a community of scholars dedicated to advancing science, technology, engineering and mathematics through the integration of research and education. I want to personally thank the CAREER coordinating committee for their continued commitment to the growth and development of early career faculty.

In describing characteristics of the 21<sup>st</sup> century, noted former thought leader Peter Drucker said: *No century in recorded history has experienced so many social transformations and such radical ones as the twentieth century...In the developed free-market countries – which contain less than a fifth of the earth's population but are a model for the rest – work and work force, society and polity, are all, in the last decade of this century, qualitatively and quantitatively different not only from what they were in the first years of this century but also from what has existed at any other time in history: in their configurations, in their processes, in their problems, and in their structures...The emerging society, the one that is based on knowledge and knowledge workers...is far more than a social change...it is a change in the human condition...Knowledge workers will give the emerging knowledge society its character, its leadership, its social profile.”* The Age of Social Transformation, *Drucker, Peter (1994), Atlantic Monthly.*

As a major funding source for STEM research and education, the National Science Foundation is central in positioning the United States in becoming an emerging society—a society of knowledge workers and innovators for the 21<sup>st</sup> century.

## **SLIDE 2** Overview of Presentation

Today, I will discuss

- NSF's Mission and Organizational Structure
- The Role of NSF in STEM Education
- Drivers Shaping the Future of STEM education
- NSF's FY2006 - FY2011 Strategic Plan *Investing in America's Future*

## **SLIDE 3** NSF's Mission

The National Science Foundation (NSF) is an independent federal agency created by Congress in 1950 "to promote the progress of science; to advance the national health, prosperity, and welfare; and to secure the national defense..." With an annual budget of about \$5.5 billion, NSF is the funding source for approximately 20 percent of all federally supported basic research conducted by America's colleges and universities.

In many fields such as mathematics, computer science and the social sciences, NSF is the major source of federal backing.

NSF fulfills its mission chiefly by issuing limited-term grants -- currently about 10,000 new awards per year, with an average duration of three years -- to fund specific research proposals that have been judged the most promising by a rigorous and objective merit-review system. Most of these awards go to individuals or small groups of investigators. Others provide funding for research centers, instruments and facilities that allow scientists, engineers and students to work at the outermost frontiers of knowledge.

The National Science Foundation Act of 1950 (Public Law 810507) authorizes NSF to engage in the following activities, among others:

- Initiate and support scientific and engineering research, and programs to strengthen scientific and engineering research potential, and education programs at all levels, and appraise the impact of research upon industrial development and the general welfare;
- Award graduate fellowships in the sciences and engineering;

- Foster the interchange of scientific information among scientists and engineers in the United States and foreign countries;
- Foster and support the development and use of computers and other scientific methods and technologies, primarily for research and education in the sciences;
- Evaluate the status and needs of the various sciences and engineering and take into consideration the results in correlating research and educational programs with other federal and non-federal programs;
- Maintain a current register of scientific and technical personnel, and in other ways provide a central clearinghouse for the collection, interpretation, and analysis of the scientific and technical resources of the United States, and provide a source of information for policy formulation by other federal agencies;
- Initiate and support specific scientific and engineering activities relating to international cooperation, national security, and the effects of scientific and technological applications upon society;
- Initiate and support scientific and engineering research, including applied research, at academic and other nonprofit institutions;
- Strengthen research and education innovation in the sciences and engineering, including independent research by individuals, throughout the United States; and
- Support activities designed to increase the participation of women and minorities and others under-represented in science and technology.

The NSF Act confers on the Presidentially-appointed National Science Board the responsibility for establishing the policies of the Foundation and serving as its governing board. The Act also directs the Board to advise the President and Congress to assure the productivity and excellence of the nation's science and engineering enterprise.

## **SLIDE 4**

### **NSF's Organizational Structure**

NSF leadership has two major components: a director who oversees NSF staff and management responsible for program creation and administration, merit review, planning, budget and day-to-day operations; and a 24-member National Science Board (NSB) of eminent individuals that meets

six times a year to establish the overall policies of the foundation. The director and all Board members serve six year terms.

Each of them, as well as the NSF deputy director, is appointed by the President of the United States and confirmed by the U.S. Senate. At present, NSF has a total workforce of about 1,700, including approximately 1,200 career employees, 150 scientists from research institutions on temporary duty, 200 contract workers and the staff of the NSB office and the Office of the Inspector General.

NSF is divided into the following seven directorates that support science and engineering research and education: Biological Sciences, Computer and Information Science and Engineering, Engineering, Geosciences, Mathematics and Physical Sciences, Social, Behavioral and Economic Sciences, and Education and Human Resources. Each is headed by an assistant director and each is further subdivided into divisions like materials research, ocean sciences and behavioral and cognitive sciences.

Some of the divisions within NSF's Office of the Director also support research and researchers. These include the Office of Polar Programs, the Office of Integrative Activities (covering activities that span many areas), the Office of International Science and Engineering and the Office of Cyberinfrastructure. Other sections of NSF are devoted to financial management, award processing and monitoring, legal affairs, outreach and other functions. The Office of the Inspector General examines the foundation's work and reports to the NSB and Congress.

## **SLIDE 5**

The following articulates the role of NSF in STEM education

- To promote a diverse and well-prepared workforce of STEM professionals and educators.
- To develop the ideas and tools that lead to innovation in STEM education through research and evaluation.
- To disseminate findings to the S&E community; and
- To promote a public understanding of science.

In addition, NSF has defined capacity-building strategies that are embedded in the goals of our STEM education programs:

NSF's invests in research on learning to facilitate the translation of research into practice to create supportive learning environments and STEM pathways by developing models of reform/systemic change at both institutional and multi-institutional levels through networking, partnerships, alliances and collaborations;

NSF identifies effective ways to prepare and support teachers and faculty who can inspire and challenge students in the STEM disciplines and to provide them with effective materials and strategies to promote and assess learning; and

NSF ensures that the STEM community is broadly representative of the nation's individuals, geographic regions, types of institutions and STEM disciplines.

## SLIDE 6

In looking to the future, one of the major challenges that we face is that of global competition in the S&E enterprise. This competition encompasses economic, education, and workforce issues.

There have been numerous reports calling for the Nation to address the increase in global competition including NSB Reports, PCAST, Council on Competitiveness Innovation Summit, and most recently, the National Academies' report *Rising Above the Gathering Storm*. This list is representative, not exhaustive.

Another critical driver is the American Competitiveness Initiative (ACI): In his Federal budget request for 2007, President Bush announced the American Competitiveness Initiative (ACI), saying that, "Education is the gateway to opportunity and the foundation of a knowledge-based, innovation-driven economy. For the U.S. to maintain its global economic leadership, we must ensure a continuous supply of highly trained mathematicians, scientists, engineers, technicians, and scientific support staff as well as a scientifically, technically, and numerically literate population."

The President proposed an ACI budget of \$130 billion over ten years for:

- Implementing research-based math curricula and interventions in schools

- Training more scientists, students, post-doctoral fellows, and technicians
- Graduating 100,000 highly qualified math and science teachers by 2015
- Increasing advanced placement tests passed by low-income students, and
- Providing workers with the skills they need for the jobs of the 21st Century.

## SLIDE 7

There are several internal drivers shaping the future of STEM education at the NSF including NSF's mission, *NSB 2020 Vision for the NSF*, and NSF's FY2006 – 2011 Strategic Plan, which I will discuss in more detail in a few minutes.

In December 2005, the National Science Board released its *2020 Vision for the National Science Foundation*. The Board outlined the following goals:

- To drive the cutting edge of fundamental and transformative research;
- To tap the talents of all of our citizens, particularly those belonging to groups that are underrepresented in the science and research enterprise, and continue to attract foreign students and scientists to the U.S.;
- To develop and test new approaches to teaching science to elementary and secondary school students and catalyze partnerships among schools, museums, aquariums, and universities to put these techniques into effective practice;
- To provide the bright minds in our research institutions with the tools and instruments needed to probe the frontiers of knowledge and develop ideas that can transform our understanding of the world; and
- To maintain the financial and talent resources to be an effective agent for excellence in the critical national enterprises of learning, discovery and innovation.

And, of course, EHR's mission is **to achieve excellence in U.S. science and engineering education at all levels and in all settings**, and to ensure the development of a diverse and well-prepared workforce of scientists, engineers, mathematicians, technicians, and educators; and a well-informed citizenry.

## SLIDE 8

More recently, NSF released it's strategic plan for FY 2006 to FY 2011, *Investing in America's Future*, that responds to the...

- Globally increasing pace, scope, and impact of fundamental science and engineering
- Escalating need to improve math/science education and technical workforce development
- Emerging new modes of inquiry and new tools for investigation; and
- The need for continued excellence in NSF as a capable and responsive organization.

## SLIDE 9

In addition, our Core Values are essential and enduring tenets that influence everyone in the organization and support the mission.

At NSF, we are:

- Visionary- Imagining the future, working at the frontier, realizing the full potential of people, furthering promising ideas wherever and whenever they arise, and encouraging creativity and initiative;
- Dedicated to Excellence - Continually improving our ability to identify opportunities; investing optimally the resources entrusted to us; managing a diverse, capable motivating organization; rewarding accomplishment; and sharing our best insights with others;
- Broadly Inclusive - seeking and accommodating contributions from all sources while reaching out especially to groups that have been underrepresented; serving scientists, engineers, educators, students

and the public across the nation; and exploring every opportunity for partnerships, both nationally and internationally.

- **Accountable** – operating with integrity and transparency, maintaining quality and relevance in administration, management and oversight.

## SLIDE 10

With these core values in mind, there are four strategic outcome goals that guide current and future NSF investments:

- **Discovery** — Foster research that will advance the frontiers 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.
- **Learning** — Cultivate a world-class, broadly inclusive science and engineering workforce, and expand the science literacy of all citizens.
- **Research Infrastructure** — Build the nation’s research capability through critical investments in advanced instrumentation, facilities, cyberinfrastructure and experimental tools.
- **Stewardship** — Support excellence in science and engineering research and education through a capable and responsive organization. In addition, strengthen our traditional partnerships and develop new collaborations with other agencies, organizations and corporations, identifying common goals that can unite and focus partnerships.

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And broadening participation in STEM is inherent in all of these goals.

At this point, you should start to recognize the commonalities among these drivers.

**SLIDE 8** NSF is also strongly committed to integrating research with education, and building capacity. The integration of research and education

supports meaningful collaborations among science and education communities that create a lasting nexus between *discovery & innovation* and *teaching & learning*.

To this end, NSF seeks

- To develop research and education capacity across the full spectrum of the nation's educational institutions;
- To utilize advanced cyberinfrastructure to transform the way we learn, teach and prepare an IT-literate workforce;
- To renew a focus on 2- and 4-year colleges and minority-serving institutions, and promote faculty enrichment programs, curricular improvements and access to research instrumentation; and
- To enhance opportunities for partnerships among community and technical colleges, 4-year colleges and research-intensive universities.

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I would like to spend a little time describing what we do in the Directorate for Education and Human Resources as part of NSF's STEM education portfolio.

As I stated earlier, EHR's mission is to achieve excellence in U.S. science and engineering education at all levels and in all settings. In pursuit of excellence, EHR has defined common goals that are inherent in its STEM education programs:

1. To prepare the **next generation of STEM professionals** and attract and retain more Americans to STEM careers.
2. To develop a robust research community that can conduct **rigorous research and evaluation** that will support excellence in STEM education and that **integrates research and education**.
3. To increase **the technological, scientific and quantitative literacy** of all Americans so that they can exercise responsible citizenship and live productive lives in an increasingly technological society.

4. To broaden participation (**individuals, geographic regions, types of institutions, STEM disciplines**) and close achievement gaps in all STEM fields.

Even though EHR consists of distinctive Divisions with targeted emphasis areas, EHR programs are part of a portfolio that seeks to advance the research and development of STEM education. One program does not work in isolation; rather, it is part of the larger whole.

### SLIDE 13

If you look at this pyramid, you are represented at the peak. You are the premiere STEM talent and NSF is committed to your development and growth. In addition, NSF is committed to grooming those whom we consider to be potential stars. Those are the students who are represented at the base of the pyramid. We realize that we will not create an emerging society by educating the few, but success will come only if we focus on educating the broader population.

*[SOURCES: First time freshmen and degrees: NCES IPEDS Fall enrollment and completions surveys, 2004; First time freshmen interested in science and engineering: UCLA Higher Education Research Institute, American Freshmen Survey, 2004; Public High School Graduates: NCES Common Core of Data, 2002/03 school year]*

And, that is what I want you to remember that you are part of a larger whole. You represent a precious community of scholars that help educate and train the next generation of scientists. Your ideas and innovations will be the foundation for what we call “being educated in the 21<sup>st</sup> century.” In other words, we need you. We need you to be bright, to ask why and then to ask why not. We need you to be mentors to those around you and to future generations of students. Your journey is just beginning and you are now a vital resource that will be called upon in the years ahead. Remember, “To whom much is given, much will be required.”

So, as you develop your research plans, I encourage you to think through the items that I have discussed today and to be cognizant of the drivers shaping the future of STEM research and education: global competition, broadening participation, partnerships, ideas and innovation; a scientific literate citizenry, building infrastructure, and of course, integrating research

and education. A clear understanding of this landscape will spearhead your development and growth as STEM faculty.

## **YOUR STORY**

## **SLIDE 14**

If we can be of assistance to you, please do not hesitate to contact us. I wish you a very productive conference.

Thank you.