**U.S. HOUSE OF REPRESENTATIVES**
**COMMITTEE ON SCIENCE AND TECHNOLOGY**

# HEARING CHARTER

***Reform K-12 STEM Education***

**Thursday, March 4, 2010**
**10:00 a.m. - 12:00 a.m.**
**2318 Rayburn House Office Building**

## 1. Purpose

On Thursday, March 4, 2010, the House Committee on Science and Technology will hold a hearing to receive testimony on innovative efforts to reform K-12 science, technology, engineering, and mathematics (STEM) education, and the critical importance of K-12 STEM education to our nation's prosperity and economic competitiveness. In particular, in preparation for reauthorization of the America COMPETES Act, we will be examining the role of the Federal agencies in supporting improvements in K-12 STEM education and promoting STEM literacy.

## 2. Witnesses

- **Dr. Jim Simons,** Founder and Chairman, Math for America
- **Ms. Ellen Futter**, President, American Museum of Natural History
- **Dr. Gordon Gee,** President, Ohio State University
- **Dr. Jeffrey Wadsworth,** President and CEO, Battelle

## 3. Overarching Questions

- What are the major barriers to increasing student interest and performance in STEM? What are some model programs and approaches that have had the most success in improving interest and performance in the STEM fields in elementary, middle, and high school? What are the common characteristics of effective programs? What data are available to support the effectiveness of such programs? How can programs with evidence of success serve as models of best practices and be brought to scale?

- How can the Federal government, including the science agencies, best support and catalyze innovative reform efforts in K-12 STEM education? How can the agencies help to improve STEM literacy among the general population?

- What role can public-private partnerships play in strengthening K-12 STEM education? How can foundations, private companies, universities, informal STEM educators, the Federal government, and other stakeholders work with States and local education agencies to improve K-12 STEM education in the classroom? What kinds of partnerships are most effective at leveraging resources, both financial and intellectual?

## 4. Background

A consensus now exists that improving STEM education throughout the nation is a necessary, if not sufficient, condition for preserving our capacity for innovation and discovery and for ensuring U.S. economic strength and competitiveness in the international marketplace of the 21st century. The National Academies *Rising Above the Gathering Storm* report emphasized the need to improve STEM education and made its top priority increasing the number of highly qualified STEM teachers. The 2007 *America COMPETES Act* implemented this recommendation by expanding and strengthening two key National Science Foundation (NSF) teacher training programs.

Two more recent STEM education reports that have generated a lot of attention have emphasized, as part of their priority recommendations, the need for greater coordination between the many public and private stakeholders in the nation's K-12 STEM education system. The reports are: *A National Action Plan for Addressing the Critical Needs of the U.S. STEM Education System*, from the National Science Board,[1] and *The Opportunity Equation*, from the Carnegie Corporation's Institute for Advanced Study.[2] The stakeholders cited in these reports include the Federal and State governments, colleges and universities, businesses, a variety of nonprofit organizations, philanthropic organizations, and of course, school districts themselves.

*K-12 STEM Education across the Federal agencies*

President Obama's FY 2011 budget request invests $3.7 billion in STEM education programs across the Federal government, including $1 billion to improve STEM education among K-12 students, an increase of over 40 percent. Of that $1 billion, nearly half would be at the Department of Education: $300 million for the proposed Effective Teaching and Learning in STEM program, and $150 million through the Investing in Innovation (i3) program. The rest of the funding is spread across the Federal science agencies.

All of the Federal science agencies fund a variety of programs and activities designed to improve K-12 STEM education. K-12 STEM education at NASA, the Department of Energy, NOAA, and the other mission agencies vary widely by type of program and target audience, with activities ranging from curriculum development and professional development opportunities for teachers, to age-appropriate field trips, online resources, research opportunities, and internships for elementary and secondary school students.

[1] http://www.nsf.gov/nsb/documents/2007/stem_action.pdf
[2] http://www.opportunityequation.org/

In a 2007 inventory of Federal STEM education programs, the Academic Competitiveness Council (ACC) identified 105 programs and approximately $3.12 billion in Fiscal Year 2006 appropriated funds across the Federal agencies for STEM education at all levels, including 24 programs designed for K-12 students funded at approximately $574 million. However, the ACC set parameters on its inventory, limiting the programs for inclusion to those "primarily intended to provide support for, or to strengthen, science, technology, engineering, or mathematics education." As a result, the ACC inventory excluded many educational activities supported by the Federal R&D mission agencies that are managed through larger research programs and offices, including major research facilities, and that do not show up as separate line items in the budget. In a Committee on Science and Technology analysis of K-12 STEM education programs across the agencies within the Committee jurisdiction, staff has found evidence of tens of millions of dollars worth of programs that were not identified in the ACC report. For example, Committee staff have identified more than 50 programs designed to improve K-12 STEM education at NASA alone, with funding ranging from a few thousand dollars to more than $35 million in FY 2008.

*K-12 STEM Education at NSF*

Historically, NSF's mission has included supporting and strengthening science and math education programs at all levels. In the area of K-12, NSF carries out its mission by funding a variety of science and math education activities, including teacher training (both in-service and pre-service), curriculum development, education research, and informal education at museums and science centers. The majority of K-12 STEM education activities at the Foundation are supported by the Education and Human Resources Directorate (EHR).

Within EHR in the Division of Undergraduate Education, examples of NSF programs designed to improve K-12 teacher performance include the Math and Science Partnership (MSP) program and the Robert Noyce Scholarship (Noyce) program, both strengthened and expanded in 2007 as part of *The America COMPETES Act*.

Within EHR's Division on Research on Learning in Formal and Informal Settings, programs targeted to K-12 education include the Discovery Research K-12 program, which funds everything from basic research on learning and teaching to the development and implementation of tools, resources, curricula, models and technologies based on the research findings; the Informal Science Education program, which funds projects that advance informal STEM education; and the Research and Evaluation on Education in Science and Engineering program, which seeks to improve the methodology of education research and evaluation of education tools and models to ensure high-quality research results and effective program development.

In the President's FY 2011 Budget Request, the Education and Human Resources Directorate would be funded at $892 million, an increase of only $19.2 million or 2.2 percent over FY 2010 funding. In the FY 2011 budget, the Noyce program would be funded at $55 million, the same level since FY 2009, and MSP would be funded at $58.2 million, the same level as in FY 2010 and a small decrease from FY 2009 funding.

*Race to the Top*

The U.S. Department of Education's $4 billion dollar Race to the Top competitive-grant program included a competitive preference for States with a demonstrated emphasis in STEM. The competitive preference, worth 3 percent of a State's total application score, has prompted many States to make STEM education a priority in their reform efforts. Additionally, the Race to the Top application guidelines encourage systemic reform, pressing States to implement interconnected reforms that include partnerships between the many STEM education stakeholders groups, including those represented in the witness panel here today. President Obama's FY 2011 budget request includes $1.35 billion to continue the Race to the Top program.

*Educate to Innovate*

President Obama also launched the "Educate to Innovate" campaign to improve the participation and performance of America's students in STEM. As part of the campaign, the President announced a series of public-private partnerships involving private companies, nonprofits, universities and other key stakeholder groups, focused on inspiring and educating K-12 students in STEM.

**5. Questions for Witnesses**

Witnesses today represent a university, a large company, a non-profit informal science provider, and a non-profit organization that invests in teacher training. All of these witnesses and their organizations are deeply committed to improving K-12 STEM education and will discuss how each of their organizations can uniquely contribute to this effort.

*Jim Simons*

1. Please describe the mission and programs of Math for America. What are the most important and effective components of the Math for America model? How have you evaluated the effectiveness of Math for America's programming? Are there any lessons learned from the Math for America experience regarding scaling and replication of proven-effective programs? In your experience, what unique role can non-profit organizations and the private sector play in supporting the teaching and learning of K-12 STEM, both locally and nationally?
2. What partnerships have you built in support of your programming – in terms of both financial support and intellectual resources? What have been the key factors to the success of such partnerships? How best can non-profit organizations partner with other public and private sector stakeholders, including local schools, businesses, colleges and universities, to take on systemic reform of K-12 STEM education in a community or region?

3. What has been your experience with K-12 STEM education programs supported by the National Science Foundation or the other Federal agencies? What specific steps would you recommend the Federal government take to improve the state of K-12 STEM education in the country?

*Gordon Gee*

1. Please describe Ohio State University's K-12 science, technology, engineering and mathematics (STEM) education programs and initiatives, in particular programs for K-12 students and pre-service and in-service teachers, as well as education research with a STEM focus. In your experience, what unique role can institutions of higher education, such as your own, play in supporting the teaching and learning of K-12 STEM both locally and nationally?
2. What partnerships has your university built, with both local schools and the private sector, to address STEM education? What have been the key factors to the success of such partnerships? How best can universities and colleges work with public and private sector stakeholders, including state and local governments, K-12 schools, business, and non-profits, to take on systemic reform of K-12 STEM education in a community or region?
3. What involvement has Ohio State had with K-12 STEM education programs at the National Science Foundation and other Federal agencies? What specific steps would you recommend the Federal government take to improve the state of K-12 STEM education in the country?

*Ellen Futter*

1. Please describe briefly the American Museum of Natural History's science, technology, engineering, and math (STEM) education programs and initiatives. In your experience, what unique role can museums and other informal education institutions play in educating students and the public about STEM? What role can museums play in supporting the teaching and learning of K-12 STEM both locally and nationally?
2. What partnerships has your museum built, with both local schools and other stakeholders, to address K-12 STEM education? How has your museum adapted its programming to meet the needs of schools and States? What have been the key factors to the success of such partnerships? How can museums best work with public and private sector stakeholders, including local schools, businesses, colleges, universities, and non-profits, to take on systemic reform of K-12 STEM education in a community or region?
3. What has been your experience with K-12 STEM education programs supported by the National Science Foundation or the other Federal agencies? What specific steps would you recommend the Federal government take to improve the state of K-12 STEM education in the country?

*Jeffrey Wadsworth*

1. Please describe briefly Battelle's science, technology, engineering, and math (STEM) education programs and initiatives. In your experience, what unique role can businesses and corporations play in supporting the improvement of teaching and learning of K-12 STEM both locally and nationally?
2. What partnerships has Battelle been involved in, with both elementary and secondary schools and other stakeholders, to address K-12 STEM education? What have been the key factors to the success of such partnerships? How can business interested in promoting and improving STEM education best work with public and other private sector stakeholders, including local schools, businesses, colleges, universities, and non-profits, to take on systemic reform of K-12 STEM education in a community or region?
3. What has been your experience with K-12 STEM education programs supported by the National Science Foundation, the Department of Energy, or the other Federal agencies? What specific steps would you recommend the Federal government take to improve the state of K-12 STEM education in the country?