

EXPERT PANEL DISCUSSION ON PREPARING THE NEXT GENERATION OF STEM INNOVATORS

FINAL AGENDA

Monday, August 24

8:00

Welcome

Dr. Patricia D. Galloway, Vice-Chairman, National Science Board

Dr. John T. Bruer, Chairman, Committee on Education and Human Resources (CEH), STEM Innovators Task Group, National Science Board

Dr. Camilla P. Benbow, Member, STEM Innovators Task Group, Committee on Education and Human Resources, National Science Board

8:15

Board Process and Participant Introductions

8:20 – 3:00

Session I: Characterization and Development of Future STEM Innovators

8:20-9:50

Cognitive and non-cognitive characteristics of an innovator

Guiding questions: What are some of the defining characteristics of an innovator and potential future innovators? How important are attributes such as ability, interest, determination, and inquisitiveness? How can theories of cognition, motivation, and other non-cognitive factors be applied to educational practices for fostering innovation? What do research on inquiry in science education and theories of intelligence and innovation add to the discussion? What research needs to be done to determine the most effective means (both cognitive and non-cognitive) for identifying STEM talent in youth and early adulthood? What are the implications for policy?

Moderator: **Dr. Camilla P. Benbow**

Panelists:

- **Dr. David Lubinski**, Professor of Psychology, Peabody College; Co-Director, Study of Mathematically Precocious Youth (SMPY)
- **Dr. R. Keith Sawyer**, Associate Professor, Department of Education, Washington University
- **Dr. Larisa V. Shavinina**, Professor of Project Management & Innovation at the Department of Administrative Sciences, Université du Québec en Outaouais (UQO), Canada

9:50

Break

10:00 -12:00

Developing STEM innovators through the education system

Guiding questions: Once we understand the characteristics of a potential innovator, how do we 1) initiate the innovation process and 2) develop a possible STEM innovator in order to increase the likelihood of productivity over an entire career? What kinds of schools or formal learning settings are best for motivating students to become STEM innovators? How can we expand the kinds of opportunities that have promising evidence on effectiveness to broader populations of students? How do we raise the ceiling of potential for the exceptionally gifted and/or motivated student? How can we best anticipate future learning environments? Why do talent losses occur at critical transition points in the educational system? How can higher education best partner with other institutional components of the innovation life cycle? What are the policy implications?

Moderator: **Dr. Diane L. Souvaine**

Panelists:

- **Dr. Nicholas Colangelo**, Director, The Connie Belin & Jacqueline N. Blank International Center for Gifted Education and Talent Development, University of Iowa
- **Dr. Stephanie Pace Marshall**, founding President of the Illinois Mathematics and Science Academy and founding President of the National Consortium for Specialized Secondary Schools of Mathematics, Science and Technology
- **Dr. Robert Root-Bernstein**, Professor of Physiology, Michigan State University
- **Dr. Lea Ybarra**, Executive Director, Center for Talented Youth, Johns Hopkins University

12:00

Lunch: Perspective from current and former students

Lunch will be provided to invited panelists and discussants only

Guiding questions: What has been your experience in the education system? Do/did you feel sufficiently challenged? Are you aware of and encouraged by your school to take advantage of enrichment opportunities, such as laboratory research partnerships, summer programs, or other opportunities such as accelerated learning? What was the most important factor in seeding your interest in the STEM disciplines? What was the biggest challenge you faced or what was the most significant negative force in terms of your education? How would you change it? What helped transform your creative potential into reality? What hinders it?

Moderator: **Dr. Kathryn D. Sullivan**

Panelists:

Introduction: **Dr. Carol Blackburn**, Johns Hopkins University

- **Richard Li**, River Hill High School, Class of 2010
- **Elena Perry**, Richard Montgomery High School, Class of 2010
- **Andrew Das Sarma**, Montgomery Blair High School, Montgomery County, Maryland, Class of 2011
- **Louis Wasserman**, University of Chicago, Class of 2012
- **Dr. Alex Wissner-Gross**, Environmental Fellow, Harvard University

1:15-3:15

Informal learning, cyber-learning and innovative education

Guiding questions: What kinds of informal learning settings are effective for motivating students to develop the skills needed to become a potential STEM innovator? How can we expand the kinds of opportunities that have promising evidence on effectiveness to more and broader populations of high potential students? How can new technologies be harnessed to serve the development and possibly enhance productivity of future STEM innovators? How can these emerging technologies be used to foster collaboration, enhance networking across multiple disciplines, and generate improvements in both informal and traditional learning environments that might nurture STEM innovation potential? What are the policy implications?

Moderator: **Dr. José-Marie Griffiths**

Panelists:

- **Dr. Arthur P. Molella**, Director, Lemelson Center for Invention and Innovation, National Museum of American History, Smithsonian
- **Dr. Diana G. Oblinger**, President and CEO of EDUCAUSE
- **Dr. Diana Rhoten**, Program Director, Knowledge Institutions; Research Director, Digital Media and Learning, Social Science Research Council

3:15

Break

3:30 – 5:30

Session II: Identifying and Nurturing Under-developed STEM Talent

Identifying under-developed pools of STEM talent and the community role in fostering achievement

Guiding questions: How can we best identify and nurture pools of potential STEM talent in our society that currently are overlooked, under-developed, and under-utilized, but could become a source of adults productive in STEM and could fuel innovation in this country? What role does the community (parents, teachers, local businesses) play in nurturing, supporting and motivating students? Do ethnically or geographically distinct subgroups of students learn differently? What role does cultural background play in talent development? What are the policy implications?

Moderator: **Dr. Louis J. Lanzerotti**

Panelists:

- **Dr. Rena F. Subotnik**, Director, Center for Psychology in Schools and Education, American Psychological Association
- **Dr. David F. Lohman**, Professor of Educational Psychology, University of Iowa
- **Dr. Frank C. Worrell**, Professor, UC Berkeley. Faculty Director, Academic Talent Development Program, Director of Research and Development, California College Preparatory Academy

- **Mr. Joshua Wyner**, Senior Vice President (Policy), National Consortium for College Completion

5:30 Dinner on your own

Tuesday, August 25

8:00 – 8:30 Keynote Address

Introduction: Dr. Arden L. Bement, Jr., Director, NSF

Keynote Address: The Honorable Arne Duncan, U.S. Secretary of Education

8:30 – 10:30 Session III: The Products of Innovation

The innovation ecology and entrepreneurship

Guiding questions: There are many factors external to the individual involved with innovation. Innovations do not occur in a vacuum, and an innovation can change its own environment. What does the research say about innovation as a product of individuals or a product of groups? How would the collaborative process factor in the learning processes associated with innovation? What can we learn from industry and business regarding innovation and entrepreneurship that would be helpful in improving formal and informal learning environments? How can lessons learned from these groups improve policy-making?

Moderator: **Dr. John T. Bruer**

Panelists:

- **Dr. Michael J. Cima**, Sumitomo Electric Industries Professor of Engineering, MIT; Director, Lemelson-MIT Invention and Innovation Center
- **Mr. Dean Kamen**, President, DeKa Research & Development
- **Dr. Kenneth Kotovsky**, Professor and Director of Undergraduate Studies in Psychology, Carnegie Mellon University

10:30 Break

10:45 – 12:45 Session IV: Perspectives on Government Education Programs and Policy

Existing government education programs, program assessment and effective policy design and implementation

Guiding questions: What are we currently doing for innovators in terms of programs and policies? What types of policy recommendations are ideal in terms of implementation? Can state/local government education policy inform Federal government policy recommendations? How do we define success in STEM

education (e.g. PISA scores, other metrics) and how does STEM education success in the U.S. compare internationally? What can we learn from successful international STEM education systems, particularly with regard to high-ability students?

Moderator: **Dr. Camilla P. Benbow**

Panelists:

- **Dr. Diane C. DiEuliis**, Assistant Director, Life Sciences, OSTP
- **Ms. Patricia Johnson**, U.S. Department of Education, Javits Gifted and Talented Students Education Program
- **Dr. Cora B. Marrett**, Deputy Director (acting), NSF

12:45

Adjourn

Additional Discussion Participants

- **Dr. Sally Goetz Shuler**, Executive Director, National Science Resource Center
- **Dr. Jo Anne Vasquez**, VP and Program Director Teacher & Curriculum Initiatives, Helios Education Foundation
- **Ms. Zipporah A. Miller**, Associate Executive Director, Professional Programs and Conferences, National Science Teachers Association