Conceptual Framework for Guiding New (Next Generation) K-12 Science Education Standards

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NSF DR K-12 Presentation

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THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine

National Academy of Sciences
National Academy of Engineering
Institute of Medicine
National Research Council

NOTE: Not all of the slides in the following presentation were shared at the 2010 DR K-12 PI Meeting.

THE NATIONAL ACADEMIES

The National Academies

- A non-governmental organization (NGO)
- Founded in 1863
- Bring together committees of experts in all areas of scientific and technological endeavor
- Address critical national issues and give advice to the federal government and the public

Conceptual Framework – representation of core ideas in science with examples of performance expectations

Standards – elaboration of core ideas into K-12 learning expectations

What is the Framework about?

"The Framework is designed to help realize a vision for science and engineering education in which students actively engage in science and engineering practices in order to deepen their understanding of core ideas in science over multiple years of school."

Why a Conceptual Framework?

- To provide intellectual guidance
- To blend current understanding of teaching and learning with new developments in science
- To decouple what is otherwise an enormously complex and challenging task

An NRC Study Committee

- Highly respected scientists and engineers from multiple disciplines
- Experts on science education
- Experts on learning sciences
- Experts on education systems and policy
- Supported by 4 design teams

Committee Members

- **Helen Quinn**, Chair Stanford University (Physics)
- **Wyatt Anderson**, University of Georgia (Biology)
- **Tanya Atwater**, UC Santa Barbara (Earth Science)
- **Philip Bell**, University of Washington (Cognitive Science)
- **Thomas Corcoran**, Center for Policy Research in Education, Columbia Teachers College
- **Rodolfo Dirzo**, Stanford University (Biology)
- **Phillip Griffiths**, Institute for Advanced Studies, Princeton (Mathematics)
- **Dudley Herschbach**, Harvard University (Chemistry)
- **Linda Katehi**, UC Davis (Engineering)
- **John Mather**, (NASA), (Astrophysics)
- **Brett Moulding**, Educator, Utah
- **Jonathan Osborne**, Stanford University (Science Education)
- **James Pellegrino**, University of Illinois at Chicago (Cognitive Science)
- **Brian Reiser**, Northwestern University (Cognitive Science)
- **Rebecca Richards-Kortum**, Rice University (Engineering)
- **Walter Secada**, University of Miami (Mathematics)
- **Deborah Smith**, Pennsylvania State University (Elementary Education)

NRC - Phase 1

- Stakeholder meetings for informed input (summer/fall, 2009)
- Study committee and design team process (starting January, 2010)
- Draft conceptual framework released for feedback July 12 – August 2, 2010
- Committee reviews feedback and finalizes report
- Report enters review in winter, 2010
- Final report in spring, 2011

Draft Framework version released in July 2010

- Disciplinary Core Ideas
  - E.g., Biological evolution explains the unity and diversity of species.
- Cross-Cutting Elements
  - Cross-cutting scientific concepts, e.g. Patterns
  - Topics in Science, Engineering, Technology, and Society
- Practices
  - Asking questions, modeling, collecting, analyzing and interpreting data, etc.

Unique aspects of the Conceptual Framework project

- Speed of project
- Includes Engineering and Technology
- Partnership
- Design teams
- Public feedback on draft
- Check for fidelity of standards with framework

Implications for Discovery Research (from July draft)

- ‘Science and engineering’ – what does this look like in a K-12 classroom?
- ‘Actively engage in practices to deepen understating of core ideas’ – models?
- ‘Over multiple years’ – how do standards become learning progressions?

Implications for Discovery Research (from July draft) - continued

- Curriculum, instruction and assessment alignment at the classroom level
- Curriculum, instruction and assessment alignment at the state level
- Development and implementation of effective pre-service and in-service materials

What next?

- Expected release of Conceptual Framework in spring 2011
- Achieve develops next generation science education standards starting from the framework
- Goal of standards completion in one year from start

BOSE Project Staff

- Heidi Schweingruber, Deputy Director, Project Co-director
- Tom Keller, Senior Program Officer, Project Co-director
- Michael Feder, Senior Program Officer
- Natalie Nielsen, Senior Program Officer
- Sherrie Forrest, Research Associate

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Ways to keep updated on Conceptual Framework

BOSE website
http://nas.edu/BOSE

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