

July 30, 2010

Committee on Conceptual Framework for New Science Education Standards
Board on Science Education
The National Academies
500 Fifth Street, NW – 11th Floor
Washington, DC 20001

Re: *A Framework for Science Education* Preliminary Public Draft

Dear Committee:

We very much appreciate the opportunity to comment on the Committee's conceptual framework for science education that will guide the development of standards and, in turn, the teaching of science for years to come. There is a great deal of engagement in developing common standards in mathematics and reading, and the possibility of creating science education standards that will prepare the next generation of students to compete successfully in the 21st century is no less engaging or daunting. We recognize the challenges and appreciate the Committee's work in taking these important first steps.

It is precisely because we share the goal of preparing all students for the challenges ahead that we write to express our grave concerns. The National Academies has the opportunity to serve science and the nation by offering a framework of science education that can educate our children and youth about the full spectrum of phenomena amenable to rigorous scientific inquiry and discovery. The absence of social and behavioral sciences as core sciences in this framework continues a paradigm of science education that suggests that only the physical and natural world are subject to observation, description, causal analysis, and prediction. To perpetuate this narrow conception in 2010 would once again be a lost opportunity—where in the end all of science suffers.

There is a significant gap between the type of science education that this framework will reinforce and what is currently happening in science. Science includes the study of social and behavioral phenomena, and science education must capture this aspect of scientific inquiry if it is to provide essential tools for the next generation to be responsible consumers of science and future science innovators. The social and behavioral sciences have significantly contributed to our understanding of human behavior as well as its links to biology and social context. The federal government itself invests significant resources to understand humans at multiple levels of analysis—from neurons to neighborhoods. In addition, the social and behavioral sciences have pioneered the development of scientific methodologies, measurement, modeling, and statistical analyses used by *all* fields of science. Thus, to fail to educate about these sciences at an early age does a disservice to society.

Science itself is recognizing the value of a more transdisciplinary approach, and the next generation of students must have a full appreciation and understanding of the *full* range of sciences that will be central to answering important scientific questions and addressing many societal challenges. For example, at the National Science Foundation, there has been major attention to the need for earth sciences and social and behavioral sciences to work jointly to understand the impact of human behavior on climate change and the potential for altering energy consumption patterns.

At present, the current draft framework of science education ignores entire areas of science (namely, the social and behavioral sciences) and does not adequately capture the transdisciplinary direction of science. The report does recognize the contributions of aspects of the social and behavioral sciences in its attention to education science, learning science, cognitive science, and decision science, but that recognition is limited to how these sciences can be used to understand children's cognitive development in order to increase the effectiveness of instruction in a smaller range of sciences (i.e., life sciences, earth and space sciences, physical sciences). The framework itself neither recognizes nor comprehends how science education needs to foster interest in and public awareness of the importance of scientific inquiry on these very issues. Although we agree that an understanding of children's development is necessary to designing the best educational and learning environments, a narrow view of what the social and behavioral sciences have to contribute to our understanding of the world and humans' place in it will ultimately disadvantage U.S. students.

We agree with the approach of applying a few core concepts to different content areas in the sciences. However, concerns that the science curriculum is "a mile wide and an inch deep" should not lead to an omission of large areas of science. Instead a more creative, integrative approach to science education—one that fosters scientific reasoning and the capacity to understand natural *and* social phenomena—should be pursued.

It is not only possible, but preferable, to create a science education curriculum that prepares students in *all* sciences, without undermining preparation in any area. Such an approach could reach a broader range of students than either the current approach to science education or the limited view envisioned by the framework under discussion. With creativity and additional work, we can identify what all students need to know—the "fewer, higher, and clearer" concepts that you are working toward—without limiting students' views of or opportunities in science. Indeed, the conceptualization of science as a process of inquiry involving hypothesis generation, model development, systematic data collection, and testing of hypotheses and models is central to the social and behavioral sciences.

In 2004, the National Science Foundation published a report on *Education and Training in the Social, Behavioral, and Economic Sciences: A Plan of Action* that specifically called on the National Research Council to "revise the National Science Education Standards so that the 'processes of science' are set forth for SBE [social, behavioral, economic] sciences (appropriate to grade level) in the same way that they are already specified for physical science, life science, and earth and space science." The integration of these sciences will add depth to children's understanding of phenomena appropriate to scientific inquiry and connect this process of scientific inquiry to human behavior and the social world in which children have a fundamental curiosity. Excluding the social and behavioral sciences is eliminating a potential source of engagement in science from very early ages throughout the life span. In this vacuum, myths and fads about how and why humans behave in certain ways are allowed to flourish. Limiting the ways in which children with differing interests and backgrounds can connect and engage with science is self-defeating if the goal is to expand understanding of and participation in science.

We recognize that the Committee's charge was narrow, but this unfortunate beginning should not limit how science education is taught for the next decade. The framework for science education needs to change fundamentally so that major areas of science are not omitted. We urge the NAS to broaden the Committee's charge so that it can seek appropriate experts to address the inadequacies in the report.

The Committee has begun the process of creating a framework, and the issues we raise can be addressed within the current report. Specifically, we ask the Committee to add a separate section in

Chapter 3 to the core disciplinary areas that will address the social and behavioral science concepts that all children must know to be “college- and career- ready.” In addition, we seek a transformation of the other chapters of the report to integrate fully the social and behavioral sciences in the family of science.

To prepare students for the 21st century, we must create a framework for science education that truly represents science. The development of science education standards should not proceed until the limitations of the report are fully addressed. The Academies is well positioned to take the lead, and we hope that you will do so. To that end, we stand ready to help.

Sincerely,

List of Societies (alphabetical order)

American Educational Research Association	Massachusetts Neuropsychological Society
American Political Science Association	National Academy of Neuropsychology
American Psychological Association	National Communication Association
American Sociological Association	Population Association of America
American Statistical Association	Psychonomic Society
Association for Applied Psychophysiology and Biofeedback	Society for Behavioral Neuroendocrinology
Association for Behavior Analysis, International	Society for Industrial and Organizational Psychology
Association for Psychological Science	Society for Judgment and Decision Making
Association of American Geographers	Society for Mathematical Psychology
Association of American Law Schools	Society for Personality and Social Psychology
Behavior Genetics Association	Society for Personality Assessment
Cognitive Science Society	Society for Psychological Research
Consortium of Social Science Associations	Society for Psychophysiological Research
Federation of Associations in Behavioral & Brain Sciences	Society for Research in Child Development
Human Factors and Ergonomics Society	Society for Research in Psychopathology
International Behavioral Neuroscience Society	Society for Social Work and Research
International Society of Developmental Psychobiology	Society of Behavioral Medicine
Justice Research and Statistics Association	Society of Experimental Social Psychology
Law and Society Association	Society of Multivariate Experimental Psychology
Linguistic Society of America	

Cc: Ralph J. Cicerone, President, National Academies
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