

FOREWORD

A *Framework for K-12 Science Education* represents the first step in a process to create new standards in K-12 science education. This project capitalizes on a major opportunity that exists at this moment—a large number of states are adopting common standards in mathematics and English/language arts and thus are poised to consider adoption of common standards in K-12 science education. The impetus for this project grew from the recognition that, although the existing national documents on science content for grades K-12 (developed in the early to mid-1990s) were an important step in strengthening science education, there is much room for improvement. Not only has science progressed, but the education community has learned important lessons from 10 years of implementing standards-based education, and there is a new and growing body of research on learning and teaching in science that can inform a revision of the standards and revitalize science education.

In this context, the Carnegie Corporation of New York, together with the Institute for Advanced Study, established a commission that issued a report entitled *The Opportunity Equation*, calling for a common set of standards in science to be developed. The Carnegie Corporation has taken a leadership role to ensure that the development of common science standards proceeds and is of the highest quality by funding a two-step process: first, the development of this framework by the National Research Council (NRC) and, second, the development of a next generation of science standards based on the framework led by Achieve, Inc. We are grateful for the financial support of the Carnegie Corporation for this project

and for their vision in establishing the partnership and two-step process for developing the new standards.

This framework builds on the strong foundation of previous studies that sought to identify and describe the major ideas for K-12 science education. These include *Science for All Americans* and *Benchmarks for Science Literacy* (1993), developed by the American Association for the Advancement of Science (AAAS), and the *National Science Education Standards* (1996), developed by the NRC. The framework is also informed by more recent work of two of our partner organizations: the AAAS (in Project 2061 especially) and the National Science Teachers Association (particularly the 2009 Anchors project). Achieve, Inc., our third partner in this endeavor, will lead the development of next-generation standards for science education based on the framework presented in this report with the aspiration that many states will choose to adopt them. We look forward to working with these organizations in the dissemination and implementation of the vision of science and engineering education that the framework embodies.

The framework highlights the power of integrating understanding the ideas of science with engagement in the practices of science and is designed to build students' proficiency and appreciation for science over multiple years of school. Of particular note is the prominent place given to the ideas and practices of engineering.

As presidents of the National Academy of Sciences and National Academy of Engineering, we are pleased to convey this report to interested readers. We believe that the education of the children of this nation is a vital national concern. The understanding of, and interest in, science and engineering that its citizens bring to bear in their personal and civic decision making is critical to good decisions about the nation's future. The percentage of students who are motivated by their school and out-of-school experiences to pursue careers in these fields is currently too low for the nation's needs. Moreover, an ever-larger number of jobs require skills in these areas, along with those in language arts and mathematics.

We thank the committee and the many consultants and NRC staff members who contributed to this effort, as well as the thousands who took the time to comment on the draft that was made public in July 2010. That input contributed substantially to the quality of this final report.

Ralph J. Cicerone, *President*, National Academy of Sciences
Charles M. Vest, *President*, National Academy of Engineering