The NSTA Reader’s Guide to
THE NEXT GENERATION
SCIENCE STANDARDS

HAROLD PRATT
The NSTA Reader’s Guide to
THE NEXT
GENERATION
SCIENCE STANDARDS
The NSTA Reader’s Guide to
THE NEXT GENERATION
SCIENCE STANDARDS

HAROLD PRATT
CONTENTS

About the Author.......................................................................................................................................................vii
Preface, by Karen L. Ostlund......................................................................................................................................... ix
Introduction.................................................................................................................................................................. xi

Chapter 1: Getting Started......................................................................................................................................... 1

Chapter 2: The Framework and History.................................................................................................................... 7

Chapter 3: Introduction to the NGSS.....................................................................................................................11

Chapter 4: Moving From the NGSS to Instruction..............................................................................................17

Chapter 5: A Guide for Leading a Study Group on the Total Curriculum ..........................................................21

Chapter 6: Implementation.......................................................................................................................................27

References ...................................................................................................................................................................35
Index ............................................................................................................................................................................37
ABOUT THE AUTHOR

Harold Pratt, a career district science coordinator and a former NSTA president, is a consultant working in all areas of science education. He was a senior program officer at the National Research Council during the development of the *National Science Education Standards*. He is the recipient of NSTA’s Robert H. Carlton Award and the coauthor of a number of science textbooks and articles.
PREFACE

NSTA fully supports the Next Generation Science Standards (NGSS) and believes the NGSS offers an extraordinary opportunity to move science education forward in the 21st century. NSTA is committed to supporting the science education community and offers many tools that promote better understanding of the NGSS, including The NSTA Reader’s Guide for the Next Generation Science Standards, an essential companion to the Next Generation Science Standards as states, districts, and schools prepare to adopt and implement the new standards. One of NSTA’s strategic goals is to advocate for the central role of science education to benefit students and society. To that end, NSTA provides high-quality products and services—print and electronic publications, e-newsletters, online and face-to-face professional development (including institutes and web seminars), conferences, and symposia that focus on the NGSS—to guide science educators along the continuum from awareness to adoption to implementation. Lean on our library of resources as you develop instructional and assessment strategies that address the NGSS. NSTA continues to develop exemplary training manuals and materials to support professional development efforts. This Reader’s Guide is a requisite piece in these efforts.

—Karen L. Ostlund
2012–2013 NSTA President
INTRODUCTION

The Next Generation Science Standards (NGSS) comprises many parts with many purposes, as evidenced by the contents of the NGSS website listed in Figure I.1. This Reader’s Guide is designed to help you navigate and understand this array of parts, interpret the standards, and take the first steps toward putting the standards into practice.

### FIGURE I.1. NGSS table of contents of the total NGSS document

NGSS Front Matter
NGSS Structure
Appendices to the NGSS
   A. Conceptual Shifts
   B. Responses to May Public Feedback
   C. College and Career Readiness (coming soon)
   D. All Standards, All Students (coming soon)
   E. Disciplinary Core Idea Progressions
   F. Science and Engineering Practices
   G. Crosscutting Concepts
   H. Nature of Science (coming soon)
   I. Engineering Design in the NGSS
   J. Science, Technology, Society, and the Environment
   K. Model Course Mapping in Middle and High School (coming soon)
   L. Connections to CCSS-Mathematics (coming soon)
   M. Connections to CCSS-ELA Literacy (coming soon)
Commonly Used Abbreviations
Why Standards Matter
Public Attitudes Toward Science Standards

Although there are many ways to navigate and make sense of the NGSS, this guide suggests a process that should be most helpful to you. By following the sequence of chapters in the guide, you will come to understand the various pieces listed in Figure I.1 in a logical and cohesive manner. The Reader’s Guide is designed to help you move along the path in Figure I.2 from the beginning stages of awareness and understanding the nature of the NGSS, to the next stage of exploring how the NGSS translates to instruction, and finally to the stage of early planning for implementation.

### FIGURE I.2. The path of progress in learning to use the NGSS

- Beginning to plan implementation
- Thinking about moving from standards to instruction
- Understanding the nature of the NGSS
- Beginning awareness
By the time you finish all six chapters, you will be on your way to a deep understanding of the NGSS and the promise it holds for science education. It’s an important journey to navigate, holding the potential for your own professional growth and for a better education for your students. Future NSTA publications will pick up where this guide leaves off with many more details about using and implementing the NGSS.

Not everyone interested in studying the NGSS will want or need, at least immediately, to proceed the entire length of the path in Figure I.2. Your depth of learning and engagement will depend on your interest or role. If you are responsible for coordination and supervision at the state, regional, or district level, this guide may be a useful starting point in your understanding and planning before moving on to more comprehensive resources.

If you are a classroom teacher, the first four chapters may be the focus of your early reading. Chapter 4 will help you better understand how the NGSS can be used to plan instruction or instructional materials. This guide is not a comprehensive how-to manual, but rather a framework to provide what we might call an operational understanding of the NGSS. Rather than just read the standards, use this guide to stimulate in-depth thinking about how to use the NGSS for instructional purposes. In doing so, you will develop a better understanding of the components of the standards and how they can be used.

Although it sometimes occurs, teachers should never be handed standards, including the NGSS, and then be expected to translate them into classroom practice on their own. Teachers are certainly capable of doing so, but the time and effort required of such a task is beyond the scope of the normal teaching assignment and the time and resources allocated for the job. This guide will help the entire science education team in a district or state understand the extent of the tasks—outlined in chapters 4, 5, and 6—that need to be accomplished. The actual work involved calls for a significant team effort and adequate resources.

The information and messages in this Reader’s Guide are in many ways the product of an NSTA team that has worked together for three years to review the Framework and then several drafts of the NGSS. Cindy Workosky coordinated the process of reviewing and providing feedback to the National Research Council (NRC) during the development of A Framework for K–12 Science Education (NRC 2012) and to Achieve Inc. during the review of the five NGSS drafts. Shortly after the Framework was released, Ted Willard joined the NSTA staff, leaving the American Association for the Advancement of Science (AAAS) after twelve years of work on the Benchmarks for Science Literacy and Atlas of Science Literacy, to help lead the review and feedback process of the NGSS drafts. More recently, as the work progressed to engaging NSTA membership in professional development, Zipporah Miller has lent her time and experience to this effort.

I have had the privilege of working with this team from the beginning and gaining from their knowledge, expertise, and experience as we considered the many issues and processes shared in this Reader’s Guide. I am grateful for what I have learned from their collegial sharing and insights. This is their work as well as mine.

—Harold Pratt
CHAPTER 3
INTRODUCTION TO THE NGSS

The Anatomy of a Standard

The Next Generation Science Standards (NGSS) consists of a series of standards for grades kindergarten through 12 such as the example standard for grade 2 that is shown in Figure 3.1 (p. 12). The standard page (in the higher grade levels there will be as many as three pages) consists of a title and code, performance expectation, foundation box, and connection box. The document does not, however, precisely define what components of the page constitute the “standard.” The reason is, each state that adopts the NGSS will need flexibility to assemble the components in a way that meets the needs of that state. The identification of the components is detailed in Figure 3.2 (p. 14), but a short overview is a helpful place to start.

Title and Code

The top of the page contains a code and title that describe the content of the standard. The grade level is designated by the first number—“2” in the example in Figure 3.1—followed by a code—“PS1”—which stands for the first set of ideas in Physical Science. For middle and high school, you will find MS and HS rather than a number representing grade level.

Performance Expectations

The performance expectations describe what a student is expected to be able to do at the completion of instruction. The statement of performance includes a phrase for each of the three “dimensions”—a practice, a disciplinary core idea, and a crosscutting concept—that the Framework specifies must be integrated in the performance expectation. These are identified by the color that corresponds to the appropriate dimension in the foundation box below it. Performance expectations are intended to guide the development of assessments, but they are not the assessment as such. They are not instructional strategies or instructional objectives, but they should influence and guide instruction. The listed order of performance expectations does not imply a preferred order for instruction. Note that most of the performance expectations also contain a clarification statement and an assessment boundary statement to provide clarity to the performance expectations and guidance to the scope of the expectations, respectively.

Foundation Box

The foundation box, which follows next on the page and actually comprises three colored columns, contains the learning goals that students should achieve and that will be assessed using the performance expectations. The three parts of the foundation box are

1. science and engineering practices (blue),
2. disciplinary core ideas (orange), and
3. crosscutting concepts (green).

The material contained in the foundation box is taken directly from the respective chapters in the Framework. The foundation box also contains learning goals identified as
2-PS1 Matter and its Interactions

Students who demonstrate understanding can:

2-PS1-1. Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. [Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.]

2-PS1-2. Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.* [Clarification Statement: Examples of properties could include strength, flexibility, hardness, texture, and absorbency.] [Assessment Boundary: Assessment of quantitative measurements is limited to length.]

2-PS1-3. Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object. [Clarification Statement: Examples of pieces could include blocks, building bricks, or other assorted small objects.]

2-PS1-4. Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot. [Clarification Statement: Examples of reversible changes could include materials such as water and butter at different temperatures. Examples of irreversible changes could include cooking an egg, freezing a plant leaf, and heating paper.]

The performance expectations above were developed using the following elements from the NRC document, A Framework for K-12 Science Education:

**Disciplinary Core Ideas**

**PS1.A: Structure and Properties of Matter**
- Different kinds of matter exist and many of them can be either solid, liquid, or gas, depending on temperature. Matter can be described and classified by its observable properties. (2-PS1-1)
- Different properties are suited to different purposes. (2-PS1-2, 2-PS1-3)
- A great variety of objects can be built up from a small set of pieces. (2-PS1-3)

**PS1.B: Chemical Reactions**
- Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. (2-PS1-4)

**Crosscutting Concepts**

**Patterns**
- Patterns in the natural and human designed world can be observed. (2-PS1-1)

**Cause and Effect**
- Events have causes that generate observable patterns. (2-PS1-4)
- Simple tests can be designed to gather evidence to support or refute student ideas about causes. (2-PS1-2)

**Energy and Matter**
- Objects may break into smaller pieces and be put together into bigger pieces, or change shapes. (2-PS1-3)

**Connections to Engineering, Technology, and Applications of Science**

**Influence of Engineering, Technology, and Science on Society and the Natural World**
- Every human-made product is designed by applying some knowledge of the natural world and is built using natural materials. (2-PS1-2)

*The performance expectations marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea.*
1. connections to engineering, technology, and applications of science (found in the green crosscutting area); and
2. connections to the nature of science (found in the practices area in this example but also can be found in the crosscutting concepts).

These supplemental goals are related to the other material in the foundation box and are intended to guide instruction, but the outcomes are not included in the performance expectations.

Appendix H, Nature of Science, and Appendix J, Science, Technology, Society, and the Environment, in the NGSS document contain more useful information about this material.

Although the NGSS does not define a standard, NSTA considers a standard to be the performance expectations and foundation box associated with a core idea at a given grade level or band.

Connection Box
To support instruction and development of instructional material, a connection box appears immediately below the foundation box. This box

1. identifies connections to other disciplinary core ideas at this grade level that are relevant to the standard (it contains the code for standards in other core ideas);
2. identifies the articulation of disciplinary core ideas across grade levels (it contains the codes of other standards in both prior and subsequent grade levels); and
3. identifies connections to the Common Core State Standards (CCSS) in mathematics and in English language arts and literacy that align to this standard (note that each CCSS standard is followed by a reference to a performance expectation).

What Are Standards?
Although the above information describes the anatomy or contents of a standard and its supporting connection box, it is important to have a more fundamental idea—independent of the NGSS—as to what standards are and how they relate to instruction, curriculum, and assessment. This understanding is important so that the role and purpose of the NGSS is understood and misconceptions do not arise during its use.

• Standards shed only partial light on how instruction should be conducted to meet the goals in the standards. The front matter of the NGSS discusses instruction but does not specify the exact nature of it for any given standard. The practices specified in a performance expectation may suggest a type of activity or behavior, but the practices do not define the type or nature of instruction.
• Standards are for all students. They can be considered an achievement level that all students should attain but not an average level of attainment. Performance for any given student or group of students may be higher as a result of instruction and expectations
Inside the NGSS Box

What Is Assessed
A collection of several performance expectations describing what students should be able to do to master this standard.

Foundation Box
The practices, core disciplinary ideas, and crosscutting concepts from *A Framework for K–12 Science Education* that were used to form the performance expectations.

Connection Box
Other standards in the Next Generation Science Standards or in the Common Core State Standards that are related to this standard.

Title and Code
The titles of standard pages are not necessarily unique and may be reused at several different grade levels. The code, however, is a unique identifier for each set based on the grade level, content area, and topic it addresses.

Performance Expectations
A statement that combines practices, core ideas, and crosscutting concepts together to describe how students can show what they have learned.

Clarification Statement
A statement that supplies examples or additional clarification to the performance expectation.

Assessment Boundary
A statement that provides guidance about the scope of the performance expectation at a particular grade level.

Engineering Connection (*)
An asterisk indicates an engineering connection in the practice, core idea, or crosscutting concept that supports the performance expectation.

Scientific and Engineering Practices
Activities that scientists and engineers engage in to either understand the world or solve a problem.

Disciplinary Core Ideas
Concepts in science and engineering that have broad importance within and across disciplines as well as relevance to people’s lives.

Crosscutting Concepts
Ideas, such as *Patterns* and *Cause and Effect*, which are not specific to any one discipline but cut across them all.

Connections to Engineering, Technology, and Applications of Science
These connections are drawn from the disciplinary core ideas for engineering, technology, and applications of science in the Framework.

Connections to Nature of Science
Connections are listed in either the practices or the crosscutting connections section of the foundation box.

Codes for Performance Expectations
Codes designate the relevant performance expectation for an item in the foundation box and connection box. In the connections to common core, italics indicate a potential connection rather than a required prerequisite connection.
designed to reach these higher goals. See a discussion of this topic in Appendix D, All Standards, All Students, in the NGSS document.

- Standards are not a plan for curriculum or a curriculum framework. Individual standards may specify learning goals for a given grade or grade band, but the order or arrangement of instruction and the learning goals within a grade level or band is not specified.
- Standards have strong implications for the professional preparation of teachers at the preservice level and the ongoing professional development of practicing teachers, but they do not specify the nature or extent of the preparation.

In rather straightforward terms, the NGSS has only two specific purposes beyond its broad vision for science education, namely (1) to describe the essential learning goals, and (2) to describe how those goals will be assessed at each grade level or band. The rest—instruction, instructional materials, assessments, curriculum, professional development, and the university preparation of teachers—is up to the science education community.
INDEX

Page numbers printed in **boldface** type refer to figures.

A
A Framework for K–12 Science Education, 7–8
conceptual framework of, 7
development of, xii, 8
dimensions of, 7–8
  crosscutting concepts, 7
disciplinary core ideas, 7–8
integration of, 8, 27–29, 28, 29
  science and engineering practices, 7
funding for, 7
guiding assumptions and organization of, 7
obtaining a copy of, 8, 18
as prerequisite for studying the NGSS, 2–3, 7–8
purpose of, 17
resources on, 4–5, 18
study group to become familiar with, 22–23
Achieve Inc., xii, 3, 8, 9, 27, 30
Activities developed from a standard, 18–20, 21
assessment of, 20
crosscutting concepts, 19
disciplinary core idea, 18–19
integration of dimensions, 18, 19–20
science and engineering practices, 19
American Association for the Advancement of Science (AAAS), xii, 8, 9
  Project 2061, 9, 30
Anderson, Andy, 6
Assessing Instructional Materials (AIM), 30
Assessment(s)
  of alignment of instructional materials with the NGSS, 30
  creation of, 20
  formative, 20, 29, 32
  learning goals for, 11, 13, 15
  making changes in, 32–33
  performance expectations and, 11, 27, 32
  of science and engineering practices, 28
  of student’s understanding of the nature of science, 25
Atlas of Science Literacy, xii, 9

B
Bell, Philip, 4, 5
Benchmarks for Science Literacy, xii, 9, 27, 29
Berland, Leema, 4, 5
Bricker, Leah, 4, 5
BSCS, 30
5E Model, 19–20, 30, 31
Bybee, Rodger, 4, 5, 19, 30

C
Carnegie Corporation, 7, 8
Checklist for gaining understanding of NGSS, 1–2
Code and title for standards, 11, 14
Common Core State Standards (CCSS) in mathematics and English language arts, 1, 13, 19, 26
Connection box, 11, 13, 14, 19, 23, 25
Course maps, 30
Crosscutting concepts, xi, 3, 7
creating activities based on, 19
discussion topics for examination of, 24
5E instructional sequence with emphasis on, 31
in foundation box, 11, 14, 19
instructional integration of, 28–29, 29
resources on, 4–6
Curriculum
making changes in, 30
study group on the NGSS in relation to, 21–26

D
Development of the NGSS, xii, 3, 8–9
NSTA’s role in, 9
partners for, 9
Disciplinary core idea(s), xi, 3, 7–8
articulation across grade levels, 25–26
connections to other disciplinary core ideas at this grade level, 25
creating activities based on, 18–19
discussion topics for examination of, 23–24
5E instructional sequence with emphasis on, 31
in foundation box, 11, 14
instructional integration of, 27
resources on, 4–5
Duschl, Richard A., 5

E
Engineering, technology, and applications of science, xi, 8, 13, 14, 24–25, 32
discussion topics for examination of, 24–25
professional development for integration of, 32
English language arts, connections to Common Core State Standards in, 1, 13, 19, 26
Exploring the Science Framework and Preparing for the NGSS (journal series), 4

F
Financial resources for implementation of the NGSS, 33
5E Model, 19–20, 30, 31
Foundation box, 11, 13, 14, 23

G
Grotzer, Tina, 6
Gunckel, Kristin, 6
Implementation of the NGSS, 27–33
changes needed for, 27–33
in assessment, 32–33
in curriculum, 30
estimating amount of, 27
in instructional materials, 30, 31
to integrate engineering, 32
to integrate practices, disciplinary core ideas, and crosscutting concepts, 27–29, 28, 29
professional development for, 31–32, 32

course maps for, 30
creating a plan for, 3
developing support for, 33
financial resources needed for, 33
in limited trial situations, 3
moving to instruction, 17–20, 20, 21
study group for planning of, 2, 21–26
timeline for decisions about, 2
workbook for, 27

Inquiry-based teaching, 28, 28

Institute for Advanced Study Commission on Mathematics and Science Education, 8
Institute of Medicine, 9

Instruction, moving from the NGSS to, 17–20
creating a description of desired results, 17–18
design process for, 17, 20
developing activities from a standard, 18–20, 21
assessment, 20
crosscutting concepts, 19
disciplinary core idea, 18–19
integration of dimensions, 18, 19–20, 27–29, 28, 29
science and engineering practices, 19
developing instructional materials, 30, 31
professional development for, 31–32, 32

Introduction to the NGSS, 11–13, 12, 11–15
anatomy of a standard, 11–13, 12
definition of a standard, 13, 15

K
Kenyon, Lisa, 4
Koballa, Thomas R., Jr., 5
Krajcik, Joe, 4, 5

L
Learning goals, 3, 11, 15, 17–18, 20, 27, 32
Learning progressions, 21, 25, 30
Lee, Tiffany, 4

M
Mathematics, connections to Common Core State Standards in, 1, 13, 19, 26
Mayes, Robert, 5
McNeill, Katherine, 5
Merritt, Joi, 4

The NSTA Reader’s Guide to the Next Generation Science Standards
Michaels, Sarah, 5
Milano, Mariel, 5
Miller, Zipporah, xii

N
National Academy of Engineering, 9
National Academy of Sciences, 8, 9
National Research Council (NRC), vii, xii, 3, 8, 9, 30
National Science Education Standards (NSES), vii, 27, 28
National Science Teachers Association (NSTA), ix, xii, 1
  membership of, 9
  resources to support the NGSS, 1, 3–6, 8, 18, 33
  role in development of NGSS, 8, 9
  Science Anchors program of, 9
Nature of science, xi, 13, 14, 22, 25
Next Generation Science Standards (NGSS)
  conceptual changes in, 1
  developing instructional materials based on, 30, 31
  development of, xii, 3, 8–9
  getting started with understanding of, 1–3
  implementation of, 27–33
  introduction to, 11–15
  moving to instruction from, 17–20, 20
  navigation of, ix–x
  NSTA resources for support of, 1, 3–6, 8, 18, 33
  organization of, 23
  path of progress in learning how to use, xi, xii
  purposes of, 15, 27
  rubric to assess alignment of instructional materials with, 30
  study group on, 2, 21–26
  table of contents for, xi
  timeline for adoption and implementation of, 1, 2, 3
  use by state, regional, or district supervisors, xii
  use by teachers, xii
Next Generation Science Standards: Adoption and Implementation Workbook, 27
Next Generation Science Standards and the Life Sciences, 30

O
Ostlund, Karen L., ix

P
Passmore, Cynthia, 5
Performance expectations, 11, 14, 21, 27, 32
  discussion topics for examination of, 24
Planning
  for implementation, 3
  for study of NGSS, 2–3, 21–26
Pratt, Harold, vii, xi–xii
Professional development, ix, xii, 3, 4, 20, 21, 26, 27, 30, 33
  designing a program for, 32, 32
to integrate engineering in curriculum, 32
to modify instruction, 31
standards and, 15
Project 2061, 9, 30

R
Reiser, Brian, 5
Riedinger, Kelly, 6
River, Ann, 5
Rubric to assess alignment of instructional materials with the NGSS, 30

S
Schwarz, Christina, 5
Schweingruber, Heidi, 5
Science, 9
Science Anchors, 9
Science and engineering practices, xi, 3, 7, 17, 18, 19, 20, 24
as assessed outcomes and instructional methodology, 28
compared with Abilities of Inquiry from the NSES, 28
creating activities based on, 19
discussion topics for examination of, 24
5E instructional sequence with emphasis on, 31
in foundation box, 11, 14, 19
integration of, 27–28
resources on, 4–5
Science for All Americans, 9
Science for the Next Generation: Preparing for the New Standards, 4
Shader, Bryan, 5
Smith, Deborah, 5
Sneider, Cary, 5
Standard(s)
anatomy/content of, 11–13, 14
creating activities from, 18–20
definition of, 13
examining a page of, 23–26
articulation of disciplinary core ideas across grade levels, 25–26
connections to Common Core State Standards in English language arts, 26
connections to Common Core State Standards in mathematics, 26
connections to other disciplinary core ideas at this grade level, 25
crosscutting concepts, 24
disciplinary core ideas, 23
discussion topics, 23
engineering, technology, and applications of science, 24–25
nature of science, 25
performance expectations, 24
report/summary of, 26
science and engineering practices, 24
example of, 12
organization of, 23
professional development and, 15
relation to instruction and curriculum, 13, 15
study group for review of, 2, 21–26

The NSTA Reader’s Guide to the Next Generation Science Standards
supporting connection box for, 13, 14
Study group, 2, 21–26
to become familiar with the Framework, 22–23
examination of a page of the standards by, 23–26
membership and size of, 21–22, 22

T
Taylor, Amy, 6
Timeline for adoption and implementation of the NGSS, 1, 2, 3
Title and code for standards, 11, 14
Translating the NGSS for Classroom Instruction, 4, 20
Tsou, Carrie, 4

U
Understanding the NGSS, 1–6
checklist for, 1–2
collecting resources for, 2
creating an implementation plan, 3
determining state or district’s plan for adoption and implementation decisions and timeline, 2
following a study plan, 2–3
forming a study group, 2, 21–26
NSTA resources for; ix, xii, 3–6
using in limited trial situations, 3
U.S. Education Delivery Institute, 27

V
Van Horne, Katie, 4, 5

W
Web seminars, 4, 5, 6, 33
WestEd, 30
Willard, Ted, xii
Workosky, Cindy, xii
Wysession, Michael E., 5
Not since the 2011 release of *A Framework for K–12 Science Education* has a document held such promise and significance for the science education community as does the *Next Generation Science Standards* (NGSS).

The NGSS aims to better prepare U.S. students for the rigor of career and college-level scientific study by stressing the importance and integration of the three dimensions: science and engineering practices, disciplinary core ideas, and crosscutting concepts. The NGSS will provide for a more integrated and cohesive approach to science instruction, leading to a more scientifically literate citizenry.

However, the NGSS also marks a change in how we think about science instruction, and the task at hand—the adoption of these new standards and their incorporation into instruction—will require a significant amount of support.

The key to unlocking the full potential of the NGSS is a deep understanding of the interrelationship of its core ideas, scientific and engineering practices, and crosscutting concepts. This brief and easy-to-use *Reader’s Guide* offers teachers, principals, district and state administrators—anyone with a vested interest in improving the quality of science education—the tools they need to fully absorb the new standards and begin to implement them, effectively, into classroom practices.