

Next Generation Science Standards

Selena Connealy

connealy@epscor.unm.edu

505-217-5605

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Goals

- Understand the process for developing the Framework and NGSS
- Be able to describe the 3 Framework dimensions
- Gain familiarity with NGSS goals and format
- Be an advocate for NGSS with your colleagues, administrators, and policy makers

Common Core State Standards

- State-led process, Lead Organizations: National Governors Association Center & Council of Chief State School Officers
- States committed to standards adoption **before** they were completed
- Assessments were development simultaneous to standards.
- Standards released in 2010.
- NIM Implementation 2010-2017



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CCSS States

- 48 states plus 2 territories and District of Columbia were initial members
- Texas and Alaska were not members of initiative.
- Virginia was initially a member, but won't adopt.
- Minnesota adopted only ELA.
- Nebraska hasn't adopted yet.




CCSS Subjects

- Mathematics (K-12)
- English Language Arts
 - Reading, Writing, Speaking & Listening, Language (K-12)
 - Literacy in History/Social Studies, Science, & Technical Subjects (6-12)



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Common Core State Standards Initiative | English Language Arts Standards | Science & Technical Subjects | Grade 6-8
www.corestandards.org/ELA-Literacy/RST/6-8
Inbox (2) - connealy@epscoR.unm.edu - EPSCoR/DataONE Mail
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COMMON CORE STATE STANDARDS INITIATIVE
PREPARING AMERICA'S STUDENTS FOR COLLEGE & CAREER

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The Standards
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Kindergarten-Grade 12

- Introduction
- Anchor Standards
- Reading: Literature
- Reading: Informational Text
- Reading: Foundational Skills
- Writing
- Speaking & Listening
- Language
- Standard 10: Range, Quality, & Complexity

Grades 6-12 Literacy in History/Social Studies, Science, & Technical Subjects

- History/Social Studies
- Science & Technical Subjects

- » Introduction
- » Grade 6-8
- » Grade 9-10
- » Grade 11-12

Writing

ELA Appendices

- English Language Arts Appendix A
- English Language Arts Appendix B
- English Language Arts Appendix C

English Language Arts Standards » Science & Technical Subjects » Grade 6-8

Standards in this strand:

CCSS.ELA-Literacy.RST.6-8.1	CCSS.ELA-Literacy.RST.6-8.2	CCSS.ELA-Literacy.RST.6-8.3
CCSS.ELA-Literacy.RST.6-8.4	CCSS.ELA-Literacy.RST.6-8.5	CCSS.ELA-Literacy.RST.6-8.6
CCSS.ELA-Literacy.RST.6-8.7	CCSS.ELA-Literacy.RST.6-8.8	CCSS.ELA-Literacy.RST.6-8.9
CCSS.ELA-Literacy.RST.6-8.10		

Key Ideas and Details

CCSS.ELA-Literacy.RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.

CCSS.ELA-Literacy.RST.6-8.2 Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

CCSS.ELA-Literacy.RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

Craft and Structure

CCSS.ELA-Literacy.RST.6-8.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6-8 texts and topics*.

CCSS.ELA-Literacy.RST.6-8.5 Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.

CCSS.ELA-Literacy.RST.6-8.6 Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.

Integration of Knowledge and Ideas

CCSS.ELA-Literacy.RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

CCSS.ELA-Literacy.RST.6-8.8 Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.

CCSS.ELA-Literacy.RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Range of Reading and Level of Text Complexity

CCSS.ELA-Literacy.RST.6-8.10 By the end of grade 8, read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently.

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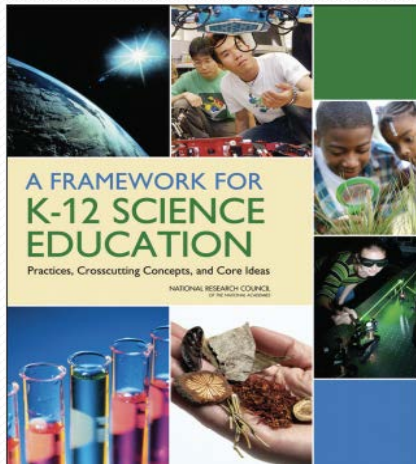
CCSS Science and Technical Subjects: Grades 6-8

Key Ideas and Details

- [CCSS.ELA-Literacy.RST.6-8.1](#) Cite specific textual evidence to support analysis of science and technical texts.
- [CCSS.ELA-Literacy.RST.6-8.2](#) Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
- [CCSS.ELA-Literacy.RST.6-8.3](#) Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

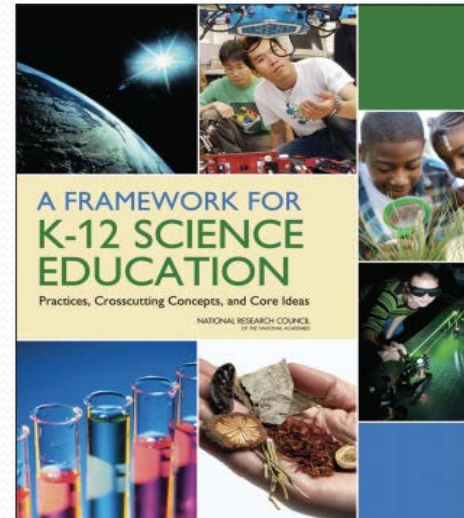
New Science Standards

- Two-part process
 - Framework for K-12 Science Education, July 2011
 - Next Generation Science Standards, April 2013



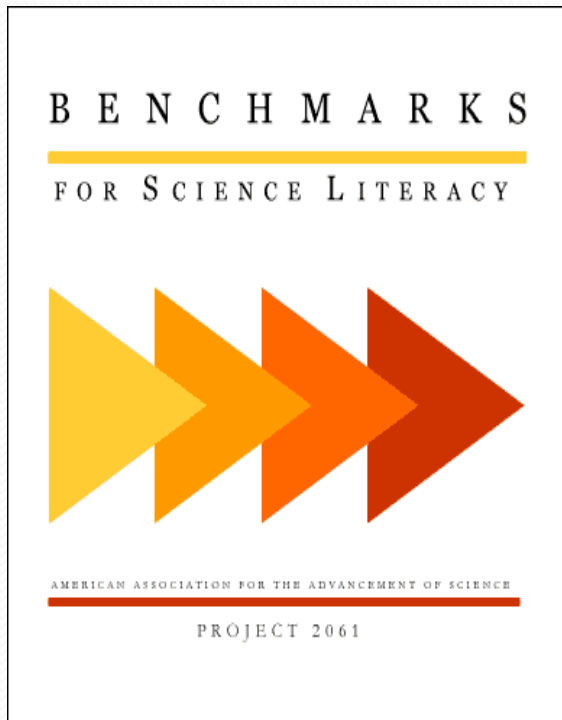
A Framework for K-12 Science Education

- Developed by National Research Council with funding from Carnegie
- Engaged subject matter experts and education experts
- One public review
- Published July 2011

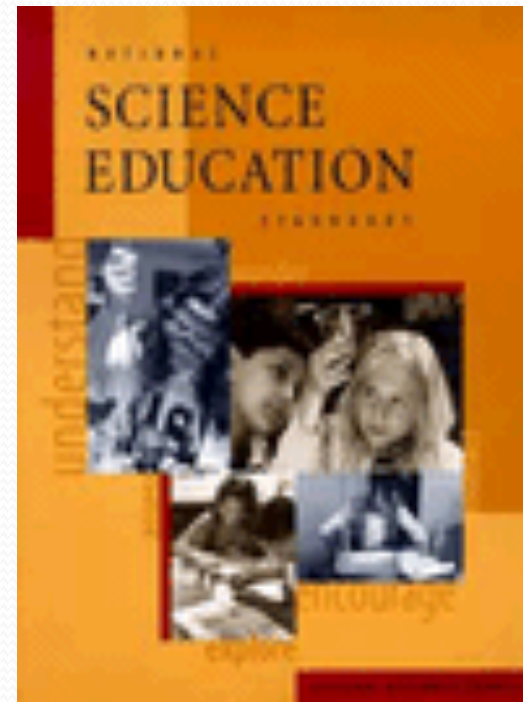


Vision for Science Education

Builds on existing national science education efforts



1993



1996

Vision



Students, over multiple years of school, actively engage in science and engineering practices and apply crosscutting concepts to deepen their understanding of each fields' disciplinary core ideas.

More about Vision for Science Education

The Framework's vision takes into account two major goals for K-12 science education:

- (1) Educating **all students** in science and engineering.
- (2) Providing the **foundational knowledge** for those who will become the scientists, engineers, technologists, and technicians of the future.

The Framework principally concerns itself with the first task—what all students should know in preparation for their individual lives and for their roles as citizens in this technology-rich and scientifically complex world.

Framework Goals

The Framework endeavors to move science education toward a more coherent vision in three ways:

First – It is built on the notion of **learning as a developmental progression**.

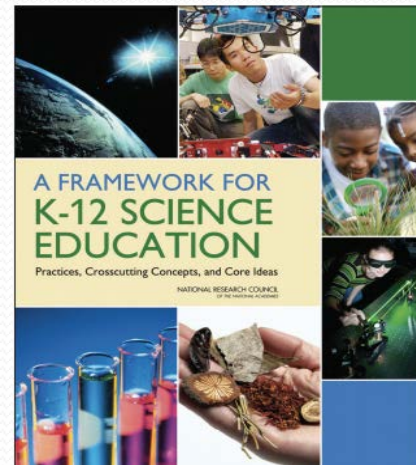
Second – The expectation is that students **engage in scientific investigations and argumentation** to achieve deeper understanding of core science ideas.

Third – The Framework emphasizes that learning science and engineering involves integration of the knowledge of scientific explanations (i.e., content knowledge) and the practices needed to engage in scientific inquiry and engineering design. Thus, the Framework seeks to illustrate how **knowledge and practice must be intertwined** in designing learning experiences in K-12 science education.

Dimensions of the Framework

The Framework establishes three dimensions for science learning

1. Scientific and Engineering Practices
2. Crosscutting Concepts
3. Disciplinary Core Ideas



Dimension 1:

Scientific and Engineering Practices

1. Asking questions (science) and defining problems (engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (science) and designing solutions (engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Dimension 2: Crosscutting Concepts

1. Patterns
2. Cause and effect
3. Scale, proportion, and quantity
4. Systems and system models
5. Energy and matter
6. Structure and function
7. Stability and change

Dimension 3: Disciplinary Core Ideas

Physical Sciences

- PS 1: Matter and its interactions
- PS 2: Motion and stability: Forces and interactions
- PS 3: Energy
- PS 4: Waves and their applications in technologies for information transfer

Life Sciences

- LS 1: From molecules to organisms: Structures and processes
- LS 2: Ecosystems: Interactions, energy, and dynamics
- LS 3: Heredity: Inheritance and variation of traits
- LS 4: Biological Evolution: Unity and diversity

Earth and Space Sciences

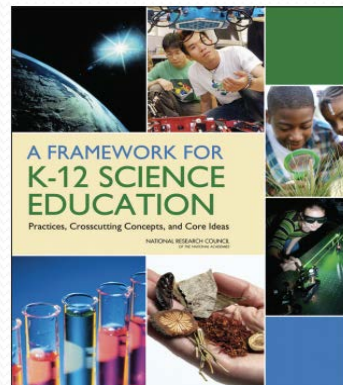
- ESS 1: Earth's place in the universe
- ESS 2: Earth's systems
- ESS 3: Earth and human activity

Engineering, Technology, and the Applications of Science

- ETS 1: Engineering design
- ETS 2: Links among engineering, technology, science, and society

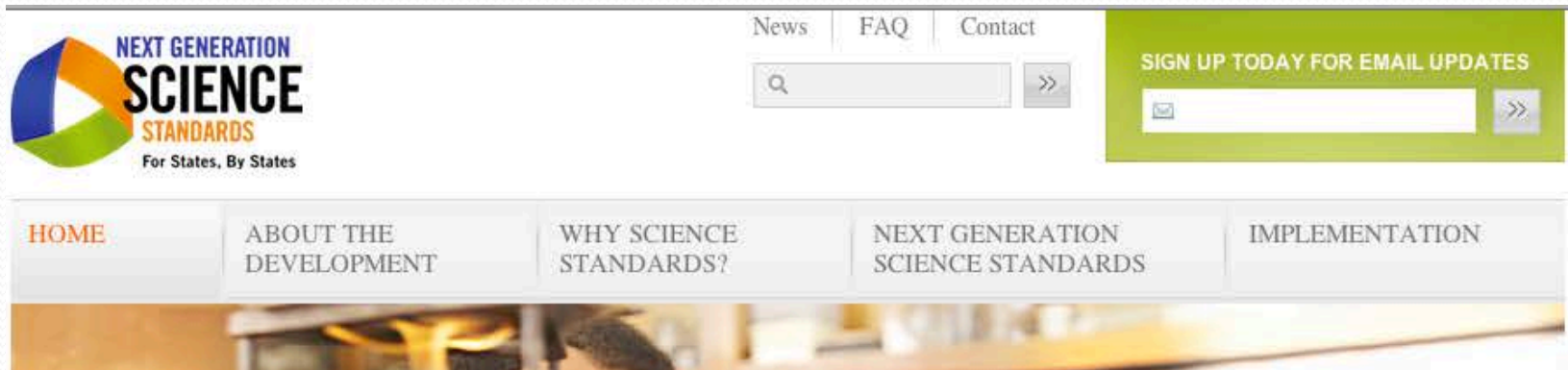
Features of Framework Document

- Discussion of three dimensions in detail
- Endpoint statements for 2nd grade, 5th grade, 8th grade and 12th grade
- Available on NAP website as free PDF or hard copy (\$35.96)
- http://www.nap.edu/catalog.php?record_id=13165

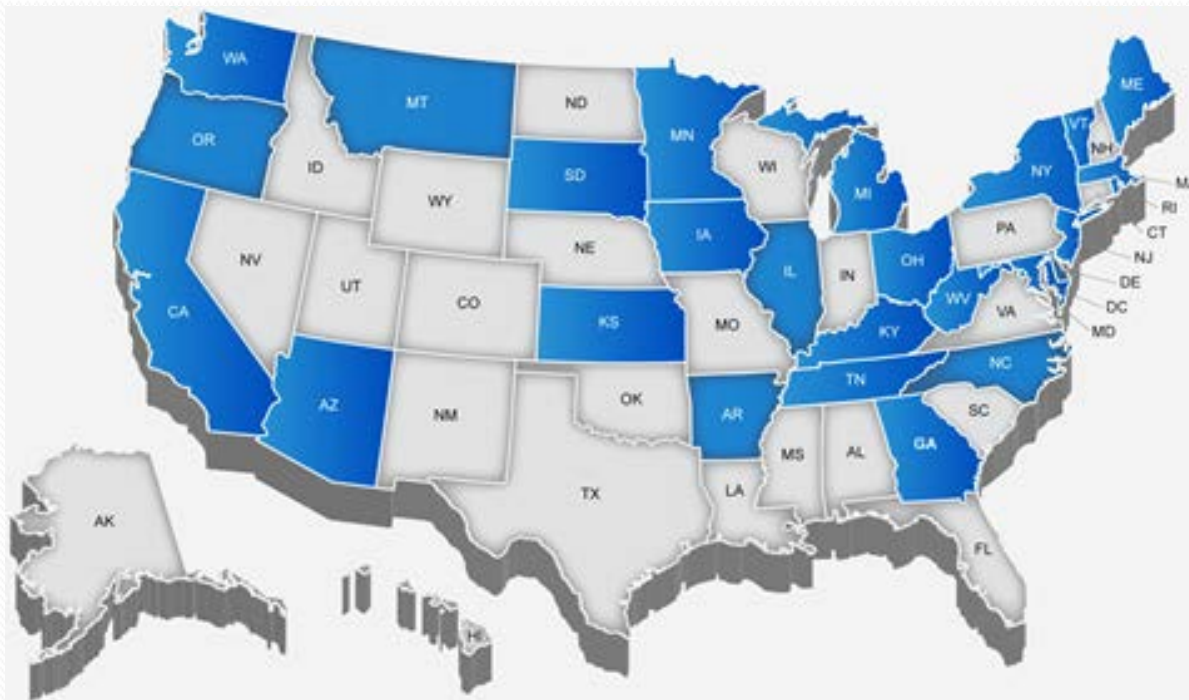


Next Generation Science Standards

- Lead Partners: Achieve, Inc., National Science Teachers Association, AAAS, National Research Council
- 26 Lead States participated in the standards development



26 NGSS Lead States



NGSS Process

- Initial public draft released in May 2012
- Second public draft released in January 2013
- Final version published in April 2013
- Thousands of people participated in public comment!
- Assessment conversation is only beginning.

Businesses Support NGSS

ANTIGEN DISCOVERY, INC
AUTODESK, INC.
BATTELLE MEMORIAL INSTITUTE
BAYBIO ASSOCIATION
BAYBIO INSTITUTE
BAYER CORPORATION
BAY AREA COUNCIL
BROADCOM
BURROUGHS WELLCOME FUND
BUSINESS-HIGHER EDUCATION FORUM
CA TECHNOLOGIES
CARDINAL HEALTH
CAROLINA BIOLOGICAL SUPPLY COMPANY
CAUSECAST
CELGENE
CHANGE THE EQUATION
CHEVRON
CISCO SYSTEMS
COMCAST
THE COPPER RIVER GROUP, INC.
CORNING, INC.
DELL INC.
DUPONT
EATON
ELI LILLY
E-LINE MEDIA
EMC₂
EPIC GAMES
EXXONMOBIL
HITACHI HIGH TECHNOLOGIES AMERICA

IBM
INTEGENX, INC
INTEL
IOWA GOVERNOR'S STEM ADVISORY COUNCIL
KANSAS BIOSCIENCE ORGANIZATION
MCKINSTRY
MERCK
MICROSOFT CORPORATION
MOTOROLA SOLUTIONS
NATURE PUBLISHING GROUP
ONCOMED PHARMACEUTICALS
OPTUM RX
PARSONS
PASCO
PHOENIX BIOSYSTEM, INC
PHOTOMED TECHNOLOGIES, INC
PRUDENTIAL
RAYTHEON
R.E.A.L. COALITION
REDWOOD BIOSCIENCE
SALLY RIDE SCIENCE
SSL
SMART TECHNOLOGIES
STATE FARM
STELLAR SOLUTIONS INC.
SYMANTEC
THE TRAVELERS COMPANIES, INC.
UNITED LAUNCH ALLIANCE
VENTRIA BIOSCIENCE
VERNIER SOFTWARE AND TECHNOLOGY
VERSARTIS



Scientific, Engineering and Education Organizations Support NGSS

- American Association of Physics Teachers
- American Chemical Society
- American Federation of Teachers
- American Meteorological Society
- American Physical Society
- ASME
- Association of American Universities
- Association of Presidential Awardees in Science Teaching
- Association of Public and Land Grant Universities
- Council of State Science Supervisors
- National Association of Biology Teachers
- National Association of Geoscience Teachers
- National Association of Gifted Children
- National Education Association
- National Science Education Leadership Association
- National Science Teachers Association

NGSS Take-Home Messages

- Focus on **Deeper Understanding of Content and Application of Content.**
- Focus on a **few Disciplinary Core Ideas**
- **All Standards, All Students**
- **Science, Engineering and Technology** are integrated across K-12
- Preparing students for **college, careers and citizenship.**
- **Consensus document** reviewed by thousands of scientists and educators.

NGSS Adoption

- Adopted in CA, RI, KS, KY, MD, VT.
- Under review in many other states.
- Process has begun in NM.

Web Links

- <http://www.nextgenscience.org>
- <http://www.corestandards.org>
- <http://newmexicocommoncore.org>