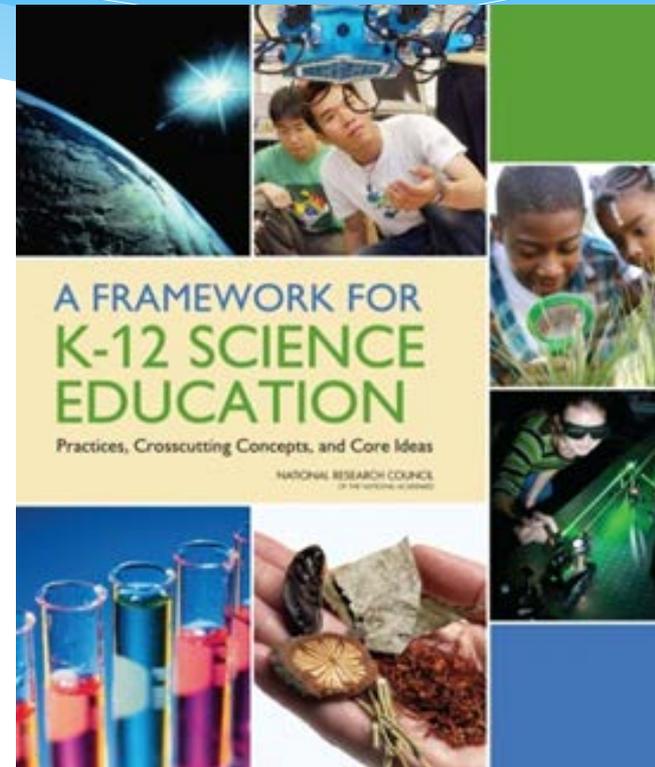


Evaluate Next Generation Aligned Materials Using EQuIP Rubric for Science

ELEMENTARY SCHOOL SCIENCE
Career & College Readiness Conferences
Summer 2014

To what extent have you interacted with this document?

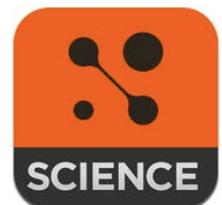
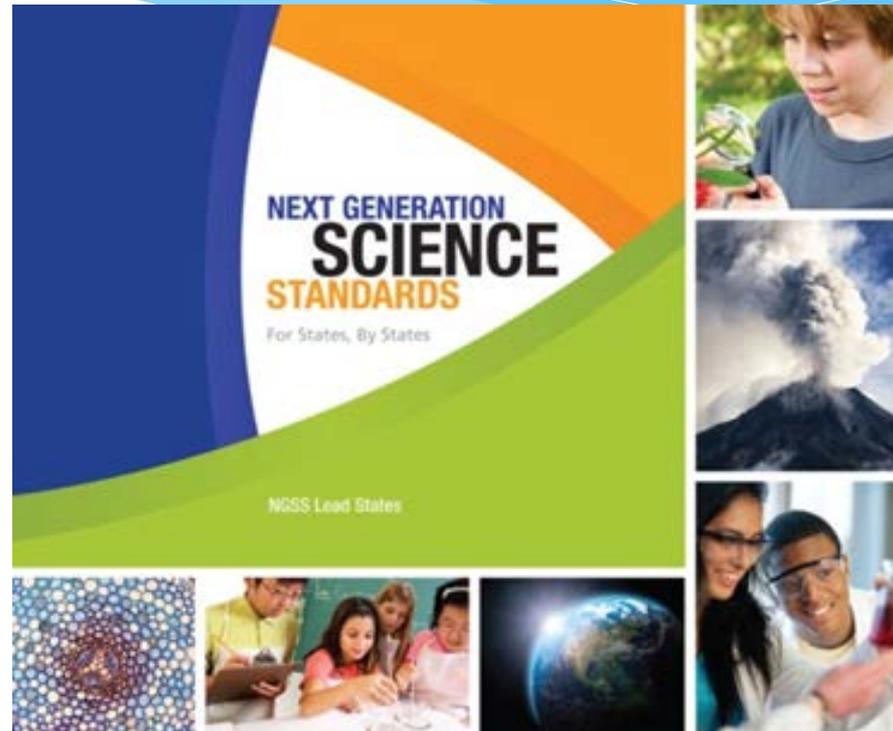
- A. I've read it thoroughly.
- B. I've skimmed it for general information.
- C. It's on my bookshelf.
- D. Huh?



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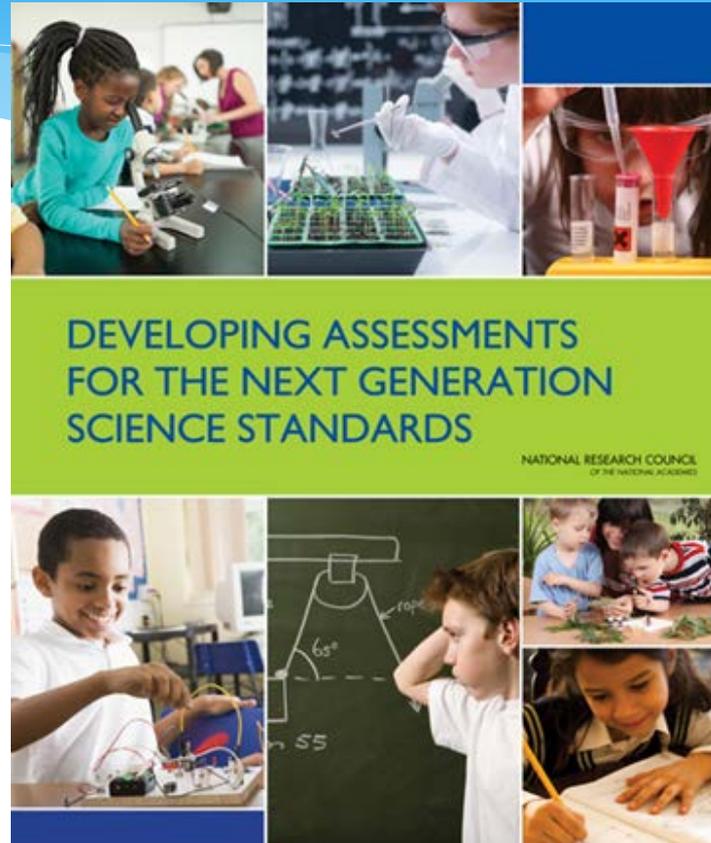
How about this one?

- A. I've read it thoroughly.
- B. I've skimmed it for general information.
- C. It's on my bookshelf.
- D. No clue



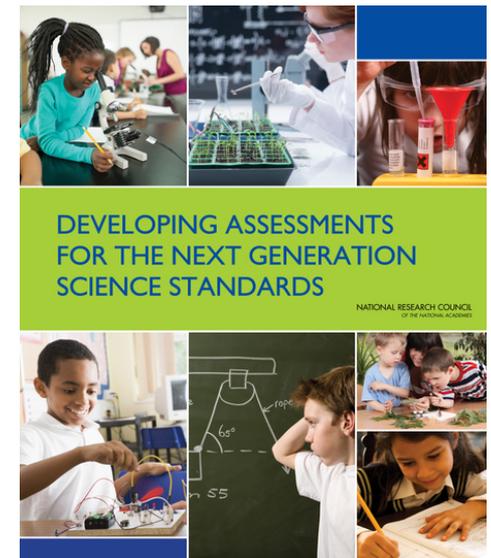
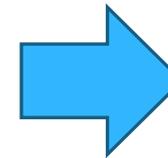
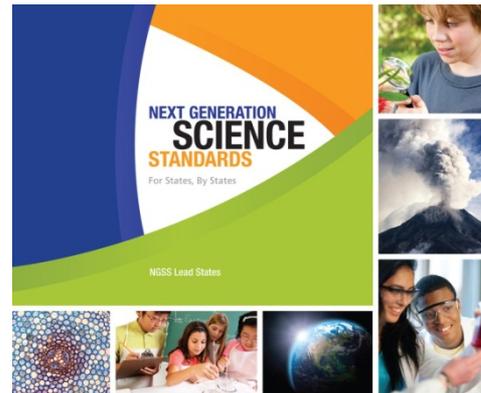
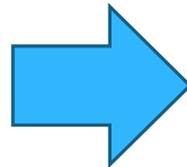
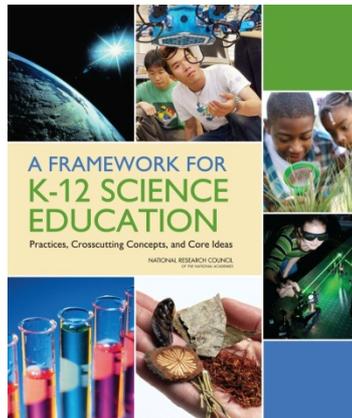
Or this one?

- A. I've read it thoroughly.
- B. I've skimmed it for general information.
- C. It's on my bookshelf.
- D. It's the first time I've seen it.



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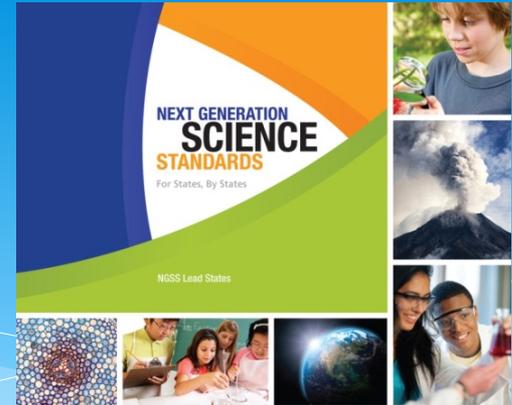
Developing Criteria for the Next Generation Science Standards



Outcomes

- Identify the purpose of the EQulP Rubric for Science
- Identify the elements (expectations) of the Rubric that supports implementation of NGSS
- Evaluate a lesson using the EQulP Rubric for Science

What is the EQuIP Rubric?



The EQuIP Rubric for Science provides criteria by which to measure the alignment and overall quality of lessons and units in respect to NGSS.

<http://nstahosted.org/pdfs/ngss/EQuIPRubric.April.2014.pdf>

What is the Purpose of EQulP Rubric for Science?

The EQulP Rubric for Science is used to

- * provide meaningful, constructive feedback to developers of lessons or units.
- * review existing instructional materials to determine what revisions are needed.
- * identify exemplars/models for teachers to use.
- * guide collegial review and jurying processes.

Intended Use

The rubric is designed to evaluate

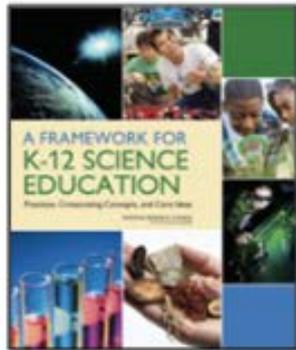
- * lessons that include instructional activities and assessments aligned to the NGSS that may extend over a few class periods.
- * units that include integrated and focused lessons aligned to the NGSS that extend over a longer period of time.

Addressing the NGSS Shifts





Shifts in NGSS for K-12 science: Both *Evolutionary* and *Revolutionary*



1. Organized around disciplinary core ideas (explanatory ideas)
2. Central role of scientific practices
3. Coherence: building and applying ideas across time



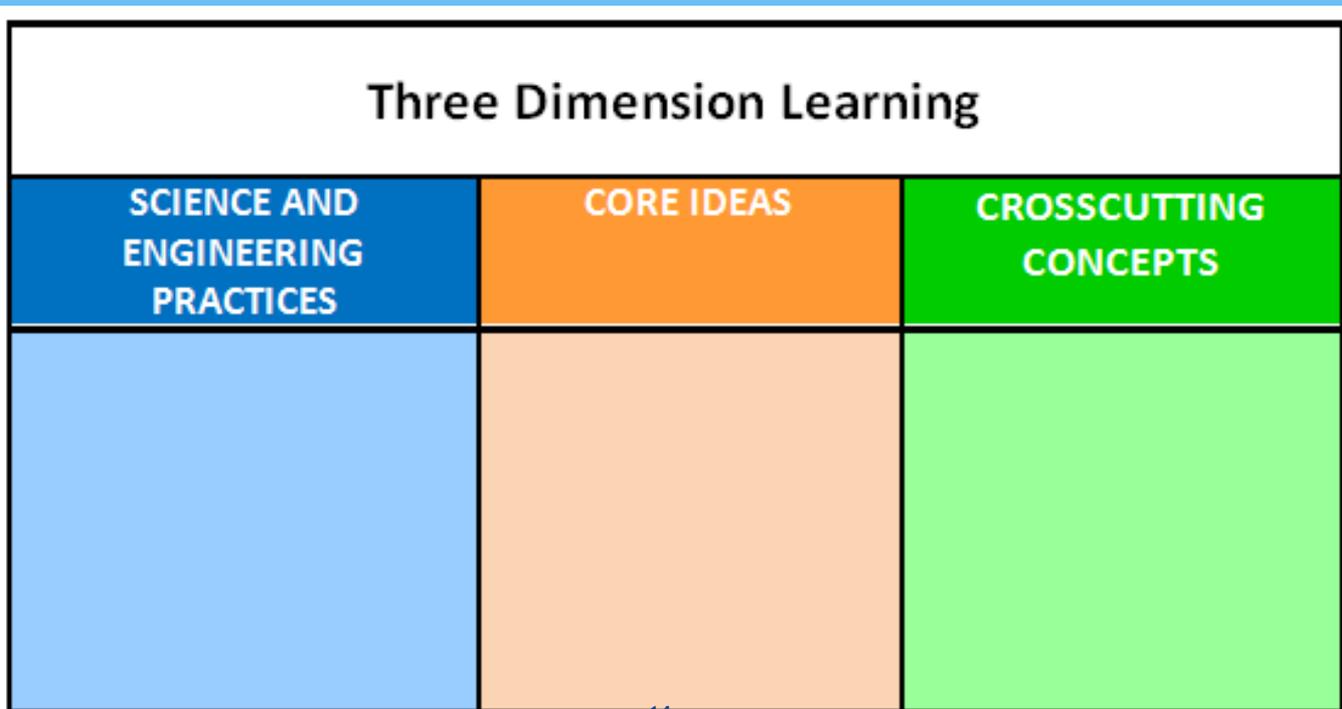
Conceptual Shifts in the NGSS

1. K-12 science education should reflect the interconnected nature of science as it is practiced and experienced in the real world.
2. The Next Generation Science Standards are student performance expectations – **NOT** curriculum.
3. The science concepts build coherently from K-12.
4. The NGSS focus on deeper understanding of content as well as application of content.
5. Science and Engineering are integrated in the NGSS from K–12.
6. NGSS content is focused on preparing students for college, careers, and citizenship.
7. The NGSS and Common Core State Standards (English Language Arts and Mathematics) are **Aligned**.

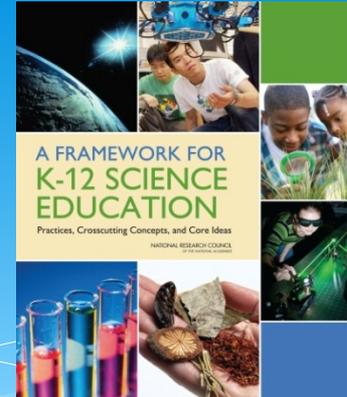


NGSS “is designed to help realize a vision for education in the sciences and engineering in which students, over multiple years of school, actively **engage** in scientific and engineering **practices** and **apply crosscutting concepts** to **deepen their understanding** of the **core ideas** in these fields.”

A lesson or unit may provide opportunities for students to demonstrate performance of practices connected with their understanding of core ideas and crosscutting concepts as foundational pieces.



Three-Dimensional Science Learning



Crosscutting Concepts

Core Ideas

Practices



4-PS3-3 Energy

Students who demonstrate understanding can:

- 4-PS3-3.** Ask questions and predict outcomes about the changes in energy that occur when objects collide. [Clarification Statement: Emphasis is on the change in the energy due to the change in speed, not on the forces, as objects interact.] [Assessment Boundary: Assessment does not include quantitative measurements of energy.]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Asking Questions and Defining Problems

Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships.

- Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships.

PS3.A: Definitions of Energy

- Energy can be moved from place to place by moving objects or through sound, light, or electric currents.

PS3.B: Conservation of Energy and Energy Transfer

- Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air, as a result, the air gets heated and sound is produced.

PS3.C: Relationship Between Energy and Forces

- When objects collide, the contact forces transfer energy so as to change the objects' motions.

Energy and Matter

- Energy can be transferred in various ways and between objects.

Connections to other DCIs in fourth grade: N/A

Articulation of DCIs across grade-levels:

K.PS2.B ; 3.PS2.A ; MS.PS2.A ; MS.PS3.A ; MS.PS3.B ; MS.PS3.C

Common Core State Standards Connections:

ELA/Literacy -

W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-PS3-3)

W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. (4-PS3-3)

This three dimensional learning leads toward eventual mastery of performance expectations.

Performance Expectation

5-PS1 Matter and Its Interactions

Students who demonstrate understanding can:

5-PS1-1. Develop a model to describe that matter is made of particles too small to be seen. [Clarification Statement: Examples of evidence could include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water.] [Assessment Boundary: Assessment does not include the atomic-scale mechanism of evaporation and condensation or defining the unseen particles.]

Science and Engineering Practices

Developing and Using Models

Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.

- Develop a model to describe phenomena.

Disciplinary Core Ideas

PS1.A: Structure and Properties of Matter

Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model shows that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon; the effects of air on larger particles or objects. (5-PS1-1)

Crosscutting Concepts

Scale, Proportion, and Quantity

Natural objects exist from the very small to the immensely large. (5-PS1-1)

Turn and Talk



Using what you know about NGSS, identify important considerations or criteria to consider when evaluating the alignment of a lesson or unit with NGSS.

A Look at the Rubric

I. Alignment to the NGSS

The lesson or unit aligns with the conceptual shifts of the NGSS:

- o Elements of the science and engineering practice(s), disciplinary core idea(s), and crosscutting concept(s), blend and work together to support students in three-dimensional learning to make sense of phenomena or design solutions.
 - o Provides opportunities to use specific elements of the practice(s) to make sense of phenomena or design solutions.
 - o Provides opportunities to construct and use specific elements of the disciplinary core idea(s) to make sense of phenomena or design solutions.
 - o Provides opportunities to construct and use specific elements of the crosscutting concept(s) to make sense of phenomena or design solutions.

Column I Lessons

3 Dimensional Learning

Column I Units

A unit or longer lesson:

- Lessons fit together coherently, build on each other, and help students develop proficiency on a targeted set of performance expectations.
- Develops connections between different science disciplines by the use of crosscutting concepts and develops connections between different science disciplines by using disciplinary core ideas where appropriate.
- Provides grade-appropriate connection(s) to the Common Core State Standards in Mathematics and/or English Language Arts & Literacy in History/Social Studies, Science and Technical Subjects.

Coherence in building and applying ideas over time.

Connections with MCCS in Math and Literacy



Column 2

Instructional Supports

What are the instructional supports identified in the rubric that are a valued indicator of quality instruction for all students?

Column 3

Monitoring Student Progress

Look for evidence of assessments that demonstrate:

- alignment to 3 dimensions of learning.
- observable evidence of performance.
- embedded formative assessment.
- use of rubrics and scoring guidelines.
- a variety of methods.
- accessibility to all students.

Group Review





Step 1 – Review Materials

Become familiar with the rubric, the lesson, or unit, and the practices, disciplinary core ideas, and crosscutting themes targeted in the lesson.



- * Review rubric and record lesson/unit title and grade.
- * Scan the organization of the lesson/unit to identify core ideas, practices, and crosscutting concepts
- * Read key materials related to instruction, assessment and teacher guidance



Step 2 – Apply Criteria in Column 1 : Alignment

- * Evaluate the lesson/unit using the criteria in the first columns.
- * Check those criteria for which **clear** and **substantial evidence** is found.

Step 3 – Apply Criteria in Columns II And III Instructional Supports and Monitoring Student Progress

- * Evaluate the lesson or unit using the criteria in the second and third columns.
- * Individually check and record each criterion on the response from for which **clear** and **substantial** evidence is found.
- * *Identify criterion-based suggestions for improvements.*



Team Discussion

- * The goal is to determine agreement about quality with respect to NGSS.
- * Use **evidence** identified during the review process to discuss the alignment of the lesson to each element in Column I, II, and III.
- * Discuss suggestions for improvement or revisions to better align the lesson with the elements identified on the rubric.

Share evaluations of lessons

Outcomes

- Identify the purpose of the EQulP Rubric for Science
- Identify the elements (expectations) of the Rubric that supports implementation of NGSS
- Evaluate a lesson using the EQulP Rubric for Science

Resources

**A Framework for K-12 Science Education:
Practices, Crosscutting Concepts, and Core Ideas (2012)**

http://www.nap.edu/catalog.php?record_id=13165#

Developing Assessments for the Next Generation Science Standards

http://www.nap.edu/download.php?record_id=18409

NSTA

<http://ngss.nsta.org/access-standards/>

NAEP Released Items

<http://nces.ed.gov/nationsreportcard/itmrlsx/default.aspx>

TIMSS Released Items

<http://nces.ed.gov/timss/educators.asp>

PISA Released Items

<http://nces.ed.gov/surveys/pisa/educators.asp>

Exit Slip

- * Write a message that describe the implications of using the NGSS EQuIP Rubric for teaching and learning in YOUR classroom.
 - * Tweet
 - * Message
 - * Facebook



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