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.

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

Outcomes

• Review the process of developing NGSS
• Discuss the implications of teaching and assessing in the three Dimensions of NGSS
• Explore teaching and assessing through Science and Engineering Practices
• Identify opportunities for formative assessment during instruction
• Examine student activities for assessment tasks
• Discuss the potential structure of an assessment system for science

Developing Assessments for the Next Generation Science Standards

Committee on the Assessment of K-12 Science Proficiency

Board on Testing and Assessment and Board on Science Education National Academy of Sciences
Topics Addressed in the Report

- The challenges of assessing three-dimensional science learning
- Principles for developing assessment tasks
- Developing classroom assessments
- Developing monitoring assessments
- Developing assessment systems
- Implementing the system

Three-Dimensional Science Learning

NGSS Assessment Messages

- New types of assessment are needed
- NGSS assessment should start with the needs of classroom teaching and learning
- State monitoring assessments must move beyond traditional forms
- States must create coherent systems of assessment that can support both classroom learning and policy monitoring functions
What should assessment look like?

Focus on Formative Assessment

Assessment Designed to Guide Instruction

To develop the skills and dispositions to use scientific and engineering practices needed to further their learning and to solve problems, students need to experience instruction in which they

- use multiple practices in developing a particular core idea and
- apply each practice in the context of multiple core ideas.
The NGSS describe specific goals for science learning in the form of *performance expectations*, statements about what students should know and be able to do at each grade level.

Each performance expectation incorporates all three dimensions, and the NGSS emphasize the importance of the connections among scientific concepts.

The Assessment Challenge

- It will not be feasible to assess all of the performance expectations for a given grade level during a single assessment occasion.

Multiple assessments

- Students will need multiple—and varied—assessment opportunities to demonstrate their competence on the performance expectations for a given grade level.
To adequately cover the three dimensions, specific components may focus on individual practices, core ideas, or crosscutting concepts. Assessment tasks will need to contain multiple components, i.e., a set of interrelated questions.

### 3-D Tasks
- Individual and/or group investigation
- Observation in tables and/or graphs
- Constructed responses
- Selected responses
- Electronic drag and drop, ordering, etc.

### Utilize the Practices
- Student activities that reflect such learning include the Practices of:
  - Developing and refining models
  - Generating, discussing, and analyzing data
  - Engaging in both spoken and written explanations and argumentation

### Challenges and Opportunities
- Instruction that is aligned with the Framework will naturally provide many opportunities for teachers to observe and record evidence of student learning.
- Incorporate teacher and student reflection into the process
Use a set or cluster of interrelated questions to generate evidence of NGSS knowledge

Specific questions may focus on Practices, Disciplinary Core Ideas and/or Crosscutting Concepts

The parts need to support students' three-dimensional science learning as described in a specific Performance Expectation

Students utilize chia seeds to interact with the three Dimensions of the NGSS.

Three Dimensional Assessment
Performance Expectation

Students who demonstrate understanding can:

2-LS2-1
Plan and conduct an investigation to determine if plants need sunlight and water to grow.
[Assessment Boundary: Assessment is limited to testing one variable at a time.]

Explore!

Use the magnifying glass app to observe chia seeds.

• Which “practices” are you using?
• What questions do you have about the chia seeds?
• What variables could students manipulate to investigate sprouting of the seeds?

ID the Assessment Opportunities in the 5Es

• Engage
• Explore
• Explain
• Elaborate
• Evaluate
Assessment Opportunities?

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<thead>
<tr>
<th>5E Practices</th>
<th>DCIs</th>
<th>Crosscutting</th>
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<tbody>
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<td>Engage</td>
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- Performance assessment tasks developed within the classroom
- Portfolio of classroom work samples with tasks specified by district and/or state
- Units (curriculum materials and assessments) developed outside of the classroom (district and/or state)
- Item banks of NGSS-aligned tasks, developed outside of the classroom, from which schools and teachers select

Assessment System Challenges

- A single, external large-scale assessment cannot cover the full breadth and depth of NGSS
- Performance Expectations with suitable assessment tasks take time to administer and several will be required to adequately sample NGSS PE’s
- Some practices are difficult to assess, e.g., carry out an investigation, using conventional formats of external, on-demand assessments
NGSS Main Messages

- New types of assessment are needed
- State monitoring assessments must move beyond traditional forms
- NGSS assessment should start with the needs of classroom teaching and learning
- States must create coherent systems of assessment that can support both classroom learning and policy monitoring functions

Outcomes

- Reviewed the process of developing NGSS
- Discussed the implications of teaching and assessing in the three Dimensions of NGSS
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- Identified opportunities for formative assessment during instruction
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Resources

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  

TIMSS Released Items  
http://nces.ed.gov/timss/educators.asp

PISA Released Items  
http://nces.ed.gov/surveys/psa/educators.asp
Exit Slip

- Write two statements that describe the implications for assessing student understanding in YOUR classroom.
  1) Ah-ha! statement
  2) Action(s) statement

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