New Science Assessments Measuring the NYS P-12 Science Learning Standards
Overview of Presentation

• Assessment Design Process

• Informing Instruction with Materials Resulting from Assessment Design

• Timelines for New Assessments and (Tentatively) Releasing Test Development Documents

• Opportunities for Partnership With NYSED to Prepare the Field for New Science Assessments
ASSESSMENT DESIGN PROCESS

Note: This section will provide context for each of the other topics.
What are test specifications?

• Test specifications are documented processes and design criteria that are followed when developing test items and assembling test forms
Why do we need specifications?

• To ensure:
  – Fair and consistent measurement of the content (fairness & reliability)
  – That the scores generated by tests consistently inform the questions they were designed to answer (validity)
How do we get specifications?

**Principled Assessment Design**
1. Identify the key ‘things’ a student should be able to do at the end of instruction
2. Identify evidence that indicates a student can actually do those things
3. Determine specific knowledge and skills across the range of performance
4. Build tasks that allow students to provide/produce that evidence
5. Elaborate content and fit with tasks
6. Build tests using specified numbers of type of task
7. Administer test(s)

**Why this works**
- Ensures all aspects of assessment are connected and, thus, results will inform initial questions/claims
- Allows for consistent development and administration of tests that are comparable
- Focuses on conceptual and applied student understanding
Step 1: Claims

• Identify the key ‘things’ a student should be able to do at the end of instruction

• What do we want to be able to say about a student based on how this student performs on this assessment?
Step 2: Evidence

• Identify evidence that indicates a student can actually do those things

• What does a student need to do to show us that he or she is meeting the goals we have outlined?
Step 3: PLDs

• Performance Level Descriptions (PLDs)

• Determine specific knowledge and skills

• What are the specific knowledge and skills, differentiated by performance level, that we are looking for students to demonstrate?
Step 4: Task Models/Design

- Build tasks that allow students to provide/produce that evidence

- What are the best types of tasks for students to demonstrate the (differentiated) knowledge and skills?

Note: this is where we start to think about overall form design
Step 5: Content

• Elaborate content and fit with tasks

• What content is eligible to be assessed and how does it best fit with the tasks/performances/responses?
Examples from Grade 5

• We will look at some of the specifications produced for the new Grade 5 Exam in science as examples.

• These are in draft form and still being worked on by NYS educators (including some in this room!).
  – We are looking at them today to provide concrete examples.
Example Claim

In a general sense, claims explicate what students are able to do in science at the end of grade 5.

- Claims merge concept and skill to support less emphasis on declarative factual recall and more emphasis on developing skills as a vehicle to learn and apply concepts (research shows that this leads to longer retention of concepts).

- Not all combinations of concept and skill will be appropriate given the time and format constraints of the exam, the intended purpose, audience, and rigor (i.e., some Performance Expectations (PEs) will not be able to be tested on the exam).
Drafted Claim #2 (LS) for Grades 5 & 8:

• “…demonstrate that there are patterns, processes, and relationships between and within living systems that occur which affect their relationship to the physical environment and how that has led to the diversity of the living world.”
Example Evidence

Evidence identifies what a student needs to do/say/produce to support acquisition of the claim

– Operationalize claim
– Lessen the ambiguity for teachers in understanding what is meant by a claim
– Define the specific language choices in the claim (What is meant by explain vs. describe?)
Example Evidence

For Drafted Claim #2 (LS), sample demonstrations by students include, but are not limited to:

- **LS 1.A Structure and Function**: “Demonstrate an understanding that both plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.”

- **LS 2.B Cycles of Matter and Energy Transfer in Ecosystem**: “Demonstrate an understanding that matter cycles between the air and soil and among plants, animals and microbes within an ecosystem as these organisms live and die.”
Example Performance Level Description (PLD)

PLDs are detailed descriptions of subject-specific and grade-specific knowledge and skills for the full range of each performance level.

– What does it mean, in terms of specific knowledge and skills, to get a specific performance level (i.e., 1, 2, 3, or 4 for grades 5 and 8 exams and 1, 2, 3, 4, or 5 for HS Regents exams)?
– What are the claims you can make about students at each level of performance?
– Always define performance level in terms of what students can do, not what they cannot.
– A numeric score has no meaning unless we design the test in such a way that it can be tied to specific performance in terms of knowledge and skills.
## Example PLD

<table>
<thead>
<tr>
<th>DCI</th>
<th>Level 4</th>
<th>Level 3</th>
<th>Level 2</th>
<th>Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LS1.A: Structure and Functions (4-LS 1-1)</strong></td>
<td>Construct an argument with evidence from multiple sources that plants and animals have internal and external structures that support functions such as survival, growth, behavior, and reproduction and compare these functions to another organism with similar structures.</td>
<td>Construct an argument with evidence from at least one source about how plants’ and animals’ internal and external structures support functions such as survival, growth, behavior, and reproduction.</td>
<td>Identify individual structures and their function for an organism that support survival, growth, behavior, and reproduction.</td>
<td>Identify structures of a given organism that support survival, growth, behavior, or reproduction.</td>
</tr>
</tbody>
</table>
Example PLD

• For a DCI, such as LS2.B, that has only one Performance Expectation (PE), 5LS 2-1, Level 3 PLD can be the same as the PE, though proper revisions might be necessary.

• For any DCI that has more than one PE, one or more PLDs should be written for each PE, even though it might not be appropriate to assess some of the PEs in the exam. The purpose to do so is that teachers can use the PLDs for classroom instruction and/or assessment.
NYS Level 4
  – (…exceed grade-level expectations of learning standards)

NYS Level 3
  – (…meet grade-level expectations of learning standards)

NYS Level 2
  – (…partially meet grade-level expectations of learning standards)

NYS Level 1
  – (…demonstrate knowledge and skills below Level 2)
NYS Level 5
(…meet grade-level expectations of learning standards with distinction.)

NYS Level 4
(…meet grade-level expectations of learning standards…likely prepared to succeed in the next level of coursework)

NYS Level 3
(…minimally meet grade-level expectations of learning standards…meet the content area requirements for a Regents diploma but may need additional support to succeed in the next level of coursework.)

NYS Level 2
(…partially meet grade-level expectations of learning standards.)

NYS Level 1
(…demonstrate knowledge and skills below Level 2.)
Example Task Model

Task models identify the structures or shells for collecting evidence for the claims

- Task model variables will include things like item type, content, material given to examinees (stimuli, sources), things that drive difficulty up and down…etc.
- Many items can be written from one task model and there will be many models for a given assessment
  - Helps support form comparability because items between forms are developed from the same task models
Example Task Model

• Students are given a stimulus graph and asked to extract relevant information to answer a question.
Example Content

• Content details provide guidance about what is meant (or the parameters of what can be measured) by the standards.

  – What is required of students to ensure that an item or task measures each conceptual understanding (i.e., Theme)?
  – What specific content will be assessed along with the skills identified in the PLDs (i.e., details)?
<table>
<thead>
<tr>
<th>Standard Reference</th>
<th>Related Details</th>
<th>Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESS2.D Weather and Climate.</td>
<td>• Average air temperatures</td>
<td>• Prediction of future weather</td>
</tr>
<tr>
<td>3-ESS2-1 Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.</td>
<td>• Amount of precipitation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Wind speeds and directions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Seasonal data</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Geographic weather data</td>
<td></td>
</tr>
</tbody>
</table>

**Example Content**
Guidelines for New Test Development

**We Do Talk About:**
- The standards
- The practices
- The instructional shifts
- A hypothetical NYS student
- What skills students need to succeed in science

**We Try Not To Talk About:**
- The old Exam
- The old Core Curriculum
- Item types (e.g., MC, CR, etc.) until later in development process
Additional Development Notes
The current Elementary- and Intermediate-level Science Tests each include a performance test that students complete during class time, prior to the written test.

We are hearing consistently from science educators that, based on the content of the new learning standards, performance tests should still be a part of the new tests.

We have begun exploring the alignment of the current performance tests with the new learning standards and getting recommendations from NYS science educators on how to proceed.

- We are mindful of the impact that changes to the performance tests will have on schools (e.g., purchasing new supplies) and will take that into account.

Conversations about Regents Exams (i.e., performance tests or required lab activities) have not yet begun.
Computer-based Testing

• If funding is available, the new Grades 5 and 8 Science written tests will be available via computer.

• Computer delivery would use the same system as the Grades 3-8 English Language Arts and Mathematics Tests to maximize student and teacher familiarity.

• Computer delivery creates opportunities for more innovative scientific exploration, such as computer simulations, further down the road.
INFORMING INSTRUCTION WITH MATERIALS RESULTING FROM ASSESSMENT DESIGN
Informing Instruction

- Hopefully, much of what you saw in the prior slides jumped out as being useful to informing instruction.

- My #1 recommendation is: PLDs

- Claims, evidence, task models and content each may have their place.
As A Reminder…

• NYS educators and other science stakeholders (e.g., steering committee) were engaged to divide the HS standards into course maps for four HS courses.
  – Course maps are posted on SED website.

• The Office of Curriculum & Instruction has a website devoted to Science Standards Implementation Resources to support the “Raise Awareness & Build Capacity” phase of the Strategic Plan.
TIMELINES FOR NEW ASSESSMENTS AND (TENTATIVELY) RELEASING TEST DEVELOPMENT DOCUMENTS
Timelines

New York State P-12 Science Standards
Development, Adoption, and Implementation

Phase I
Raise Awareness & Build Capacity

Phase II
Transition & Implementation

Phase III
Implementation & Sustainability

Instruction aligned to NYS P12 Science Learning Standards begins...

- September 2019 for Grades P-3 and 6
- September 2020 for Grades 4 and 7
- September 2021 for Grades 5 and 8

State Level Science Assessment Development & Implementation

2016
- Standards Become Effective July 1, 2017
- December 2016 adoption of NYS P-12 Science Learning Standards.

2017
- March 2018 NYS P-12 Science Roadmap Released

2018

2019-20
- June 2020 Last administration of Grade 4 science test aligned to the 1996 Standards

2021
- June 2021 No Grade 4 science test; these students will take new science test in grade 5 in 2022
- Last administration of Grade 8 science test aligned to the 1996 Standards
- June 2022 First administration of new Elementary Grade 5 and Intermediate Grade 8 science tests

2022-24
- June 2022 First administration: Biology, and Earth and Space Science Regents Exams
- June 2023 First administration: Chemistry and Physics Regents Exams
- September 2022 Continue Phase III transition toward full implementation of the NYS 9-12 Science Learning Standards at the local level

State Level Science Assessment Development & Implementation
New Assessments

• May/June 2022
  – Grade 5 Science
  – Grade 8 Science

• June 2023
  – Regents Exam in Earth & Space Science
  – Regents Exam in Biology

• June 2024
  – Regents Exam in Chemistry
  – Regents Exam in Physics
Test Development Documents

Release Philosophy

• Communicate (raise awareness)

• Plenty of PD (build capacity)

• Do no harm (avoid confusion)
Projected Released of Test Development Documents

• Grades 5 & 8 Science
  – Claims & Evidence: 2019-20 School Year
  – PLDs: August 2020
  – Task Models: 2020-21 School Year

We expect to follow similar plans for the release of Regents Exam development materials, relative to their first administration dates.
OPPORTUNITIES FOR PARTNERSHIP WITH NYSED TO PREPARE THE FIELD FOR NEW SCIENCE ASSESSMENTS
Partnership Opportunities

1. Share today’s messages

2. Get involved in test development

3. PD with the development materials

4. Other ideas?
Thank You!

- Questions about the NYS Science Learning Standards and timelines related to instruction can be directed to the Office of Curriculum and Instruction at: emscurric@nysed.gov

- For questions about test development and assessment or development document timelines, please contact the Office of State Assessment at: emscassessinfo@nysed.gov

- Information about opportunities to participate in test development can be found at: http://www.p12.nysed.gov/assessment/teacher/home.html