

# How to Assess Three-Dimensional Learning in Your Classroom: Building Tasks that Work

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SLIDES AND RESOURCES ONLINE:

<http://tinyurl.com/NSTA3Dlearning>



April 2, 2016

NSTA Annual Conference, Nashville, TN



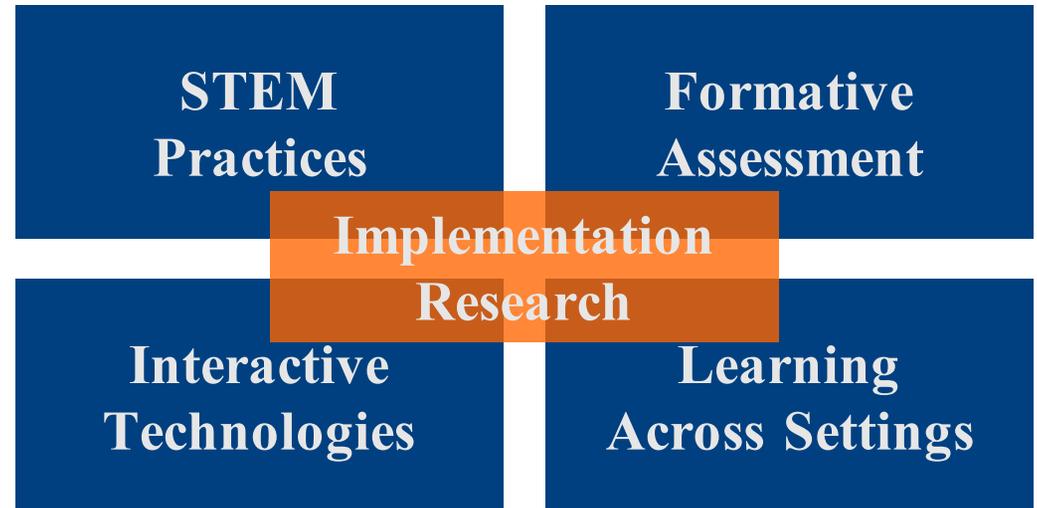
# Research+Practice Collaboratory

*Developing research-practice partnerships to investigate problems of practice and develop useful instructional strategies and tools that can be shared broadly.*

## *Collaborating Organizations*

- ✧ University of Washington Institute for Science + Math Education (Bronwyn Bevan, PI)
- ✧ Exploratorium
- ✧ Education Development Center, Inc.
- ✧ University of Colorado, Boulder
- ✧ Inverness Research Associates
- ✧ SRI International

## *Four Themes of Work*



Partnership for Science & Engineering Practices  
Seattle & Renton School Districts

Photo by Institute for Systems Biology, June 2013



# AGENDA

Introduction - Tools Available - <http://tinyurl.com/NSTA3Dlearning>

Overview of 3D Assessment Challenge

Sample Assessment Task Assessment Activity

Science and Engineering Practices - Task Formats

Steps to Designing 3D Assessments

Adapt an Existing Task



# WORKSHOP GOALS

Adapt an assessment task into a 3D task

Takeaway tools to use to design assessments

## Tools on your table...

Task Templates

Sample Assessment Tasks

Online and up front we have: Elementary and Middle School in each discipline - <http://tinyurl.com/NSTA3Dlearning>

STEM Teaching Tool: Designing 3D Assessments

Steps to Designing 3D Assessments

## ASSESSMENT CHALLENGE

How can we assess “three-dimensional learning”?

How is it different from how we assess science learning now?

How can we design tasks that elicit core ideas, practices, and crosscutting concepts?

## FOCUS TODAY: MULTI-COMPONENT TASKS

To adequately cover the three dimensions, assessment tasks will need to contain multiple components (e.g., a set of interrelated questions).

*Specific components may focus on individual practices, core ideas, or crosscutting concepts, but, together, the components need to support inferences about students' three-dimensional science learning as described in a given performance expectation.*

# How can you explain a fogged mirror?



## Sample Classroom Assessment

Imagine that it is a cold, winter day. You take a hot shower and the mirror in the bathroom fogs up.

1. Briefly describe 1 or 2 possible explanations for this phenomenon.

1)

2)

2. Pick one of your explanations to investigate by circling it above. Write a general science question that would test your selected explanation.

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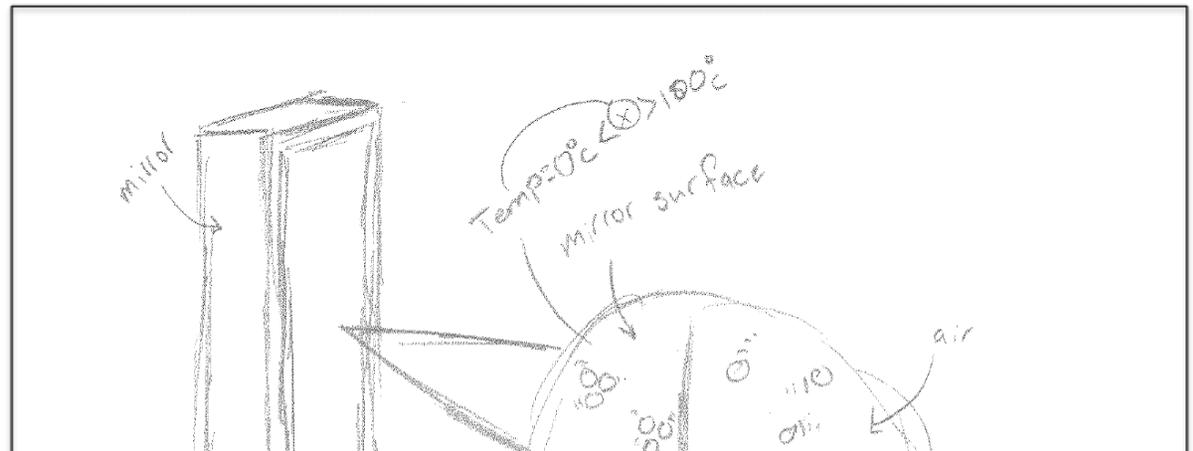
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3. Imagine that you had a powerful microscope and could see what happens when water vapor coming from the shower hits the cold mirror. Draw a scientific model of this and be sure to show:

- temperature change
- particle motion
- kinetic energy
- phase change

Clearly label all model components.



# ACTIVITY: ASSESSMENT TASKS ANALYSIS

**5-LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.** [Clarification statement: Emphasis is on the idea that matter that is not food (air, water, decomposed materials in soil) is changed by plants into matter that is food. Examples of systems could include organisms, ecosystems, and the Earth.] [Assessment boundary: Assessment does not include molecular explanations.]

**Disciplinary Core Idea:** Interdependent Relationships in Ecosystems, Cycles of Matter and Energy Transfer in Ecosystems

**Practice:** Developing and Using Models

**Crosscutting Concept:** Systems and System Models

## ACTIVITY: ASSESSMENT TASKS ANALYSIS

1. Review the sample assessment tasks provided, all of which aim to assess the Performance Expectation.
2. Rate each task in terms of how well you think it assesses the three dimensions integrated in the performance expectation (1 = not at all effective, 5 = highly effective)
3. Enter your ratings and explanations into this form:

<http://tinyurl.com/TRFormNGSS>

1. Prepare to share your process, thoughts, and **criteria you applied** for rankings with the whole group.

<http://tinyurl.com/NSTA3Dlearning>

# WHOLE GROUP DISCUSSION: ASSESSMENT TASK ANALYSIS

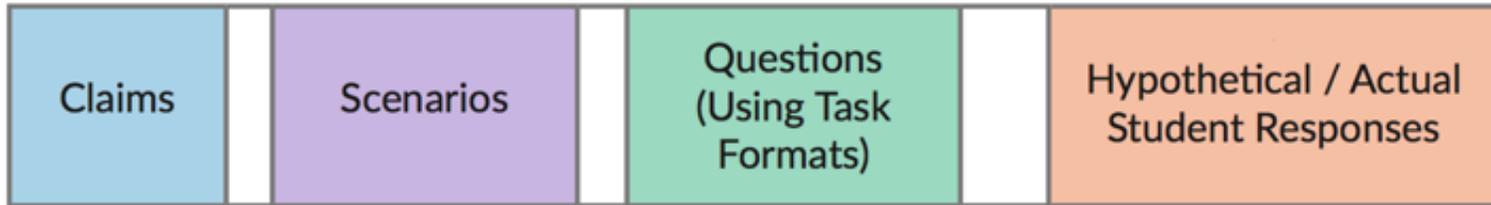
How did our ratings compare?

What are some criteria for what deciding when a task is 3D?

# STEPS TO DESIGNING (ADAPTING) 3D

## ASSESSMENTS

<http://tinyurl.com/NSTA3Dlearning>



Step 1: Define what you will assess by analyzing relevant sections of *A Framework for K-12 Science Education* and crafting learning claims.

Step 2: Brainstorm Possible Scenarios for Eliciting Student Understanding.

Step 3: Use Task Formats to Build Questions to Engage Students with the Scenario. **(START HERE TODAY)**

Step 4: Imagine the Range of Possible Student Responses to the Questions.

Step 5: Share, Review, and Revise.

# **WHOLE GROUP DISCUSSION: ASSESSMENT TASK ADAPTATION**

What did you come up with?

How might you apply this process to designing or adapting tasks in your school or district?

# Thank you!

## Resources

<http://tinyurl.com/NSTA-interest-knowledge> (other session)

<http://tinyurl.com/NSTA3Dlearning>

<http://tinyurl.com/CSSS3Dlearning>

<http://researchandpractice.org>

<http://STEMteachingtools.org> @STEMTeachTools

## Next Generation Science Assessment

<http://ngss-assessment.portal.concord.org/>

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