

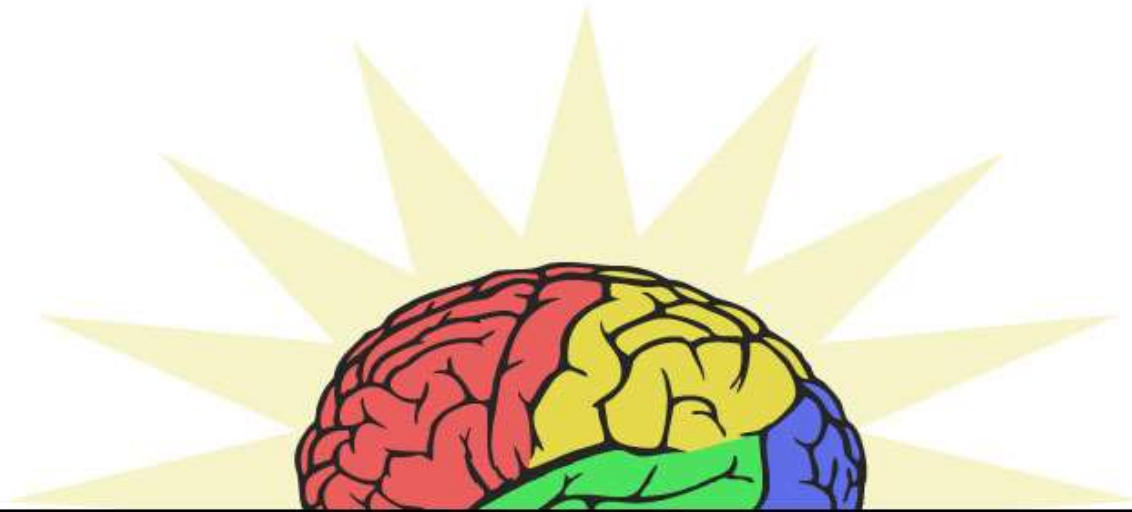
A Practical Guide for Aligning Existing Materials to the NGSS

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Timeline

- Introduction (10 min)
 - Project NEURON
 - Brief overview of NGSS
 - The EQuIP rubric
- Step 1: Review materials (10 min)
 - Review materials: rubric, lesson materials, NGSS
 - Presented lesson overview
- Step 2: Apply Category 1 criteria
 - Individually (10 min)
 - As a team (10 min)
- Step 3: Apply Category 2 & 3 criteria
 - Individually (10 min)
 - As a team (10 min)
- Debrief: Share out and feedback (10 min)



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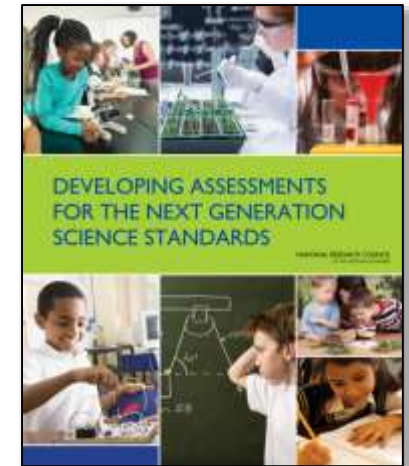
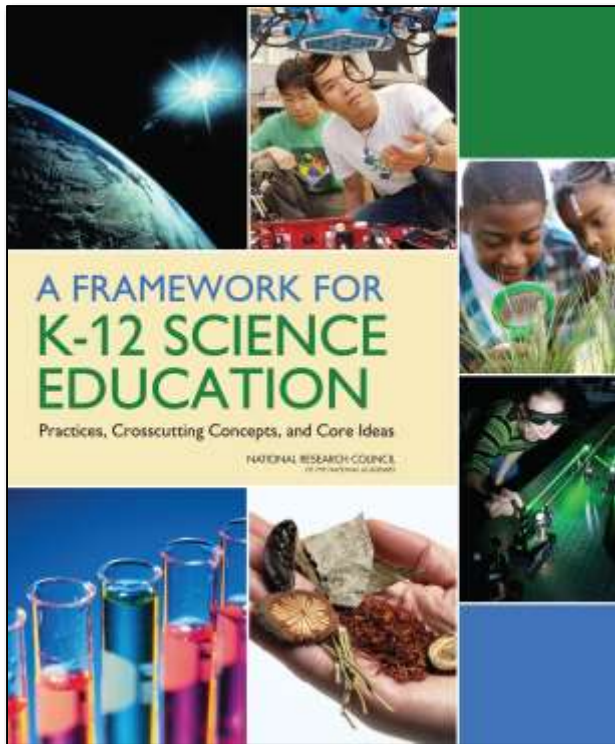
Introduction

What is Project NEURON?

- University of Illinois at Urbana-Champaign
- Educators, scientists, and graduate students
- Curriculum development
 - Inquiry-based
 - Connect to standards
- Professional development
 - Summer institutes
 - Conferences



DEVELOPMENT OF NGSS for K-12 SCIENCE



Key Elements of NGSS

Integrating the three dimensions:

- Science and Engineering Practices
- Disciplinary Core Ideas
- Crosscutting Concepts

Alignment to A Framework for K-12 Science Education and NGSS

Do you see what I see?
Light, sight, and natural selection

	L.1	L.2	L.3	L.4	L.5	L.6	L.7	
Science and Engineering Practices	Asking questions and defining problems							
	Developing and using models							
	Planning and carrying out investigations							
	Analyzing and interpreting data							
	Using mathematics and computational thinking							
	Constructing explanations and designing solutions							
	Engaging in argument from evidence							
	Obtaining, evaluating, & communicating information							
	Disciplinary Core Ideas	PS1 Matter and its interactions						
		PS2 Motion and Stability: Forces and Interactions						
PS3 Energy								
PS4 Waves and Their Applications in Technologies for Information Transfer								
LS1 From Molecules to Organisms: Structures and Functions								
LS2 Ecosystems: Interactions, Energy, and Dynamics								
LS3 Heredity: Inheritance and Variation of Traits								
LS4 Biological Evolution: Unity and Diversity								
ESS1 Earth's Place in the Universe								
ESS2 Earth's Systems								
Crosscutting Concepts	ESS3 Earth and Human Activity							
	ETS1 Engineering Design							
	ETS2 Links Among Engineering, Technology, Science, and Society							
	Patterns							
	Cause and Effect							
	Scale, proportion, and quantity							
	Systems and system models							

1 Engineering, Technology, and Applications of Science



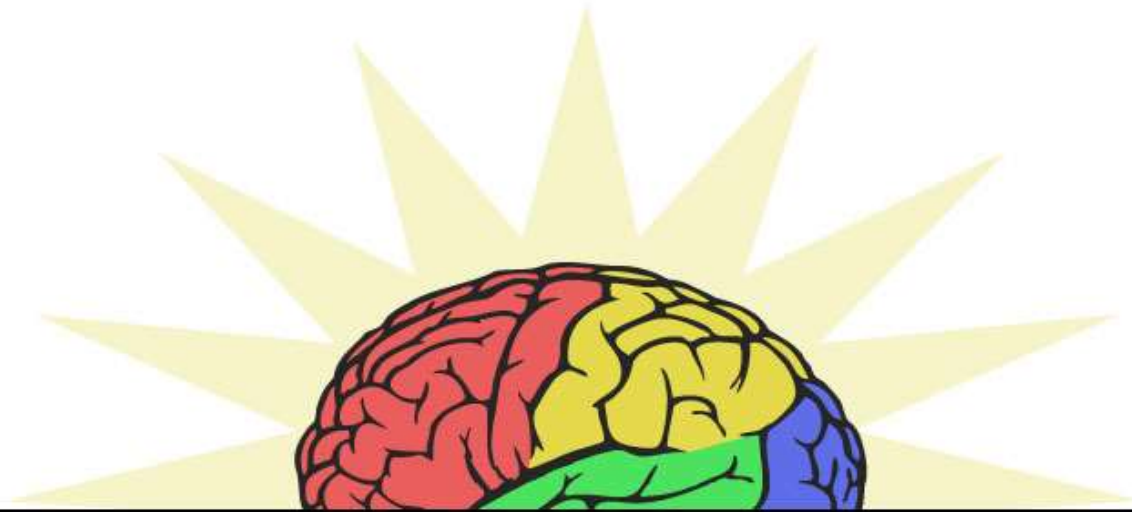
Tool to support implementation: EQuIP

- EQuIP: *Educators Evaluating Quality Instructional Products*
- Developed by Achieve + NSTA involving Framework and NGSS writers
- Analyze curriculum materials – individual lessons, sequences of lessons, units
- Evaluate – how well do the materials help achieve the important conceptual shifts in NGSS?



Overview of EQuIP

I. Alignment to the NGSS	II. Instructional Supports	III. Monitoring student progress
<p><i>A. Three dimensional:</i> Supports students in three dimensional learning to explain phenomena or design solutions</p>	<p>Supports learning for all students through meaningful scenarios, supporting practices, supports phenomena and representations</p>	<p>Assessments evaluate three-dimensional learning; include formative; are accessible and unbiased</p>
<p><i>B, C, D. Coherence:</i> Lessons fit together coherently, develops connections</p>	<p>Provides guidance for teachers to build coherence across the unit</p>	<p>Pre, formative, and summative aligned to three-dimensional learning</p>



The EQulP Rubric

Step 1: Review Materials

Overview of Unit/Lesson

Do you see what I see?

1. What do I see?
2. How does biology affect perception?
3. How does the environment affect perception?
4. What are color and light?
5. What is a fish's favorite color?
6. Why do guppies have favorite colors?
7. What do you see?



Novel Education for Understanding Research On Neuroscience

Project NEURON is a large, cutting-edge, online middle and high school science program that integrates biology, chemistry, and physics with neuroscience research conducted at the University of Illinois.

<http://neuron.illinois.edu/>

Do you see what I see?
light, light, and natural selection

Lesson 1: What do I see?
This introductory lesson introduces the unit "Do you see what I see?" by introducing students to selected differences in visual perception. In small groups, students take on a variety of roles and gain first-hand experience regarding perception, perception tests, and cognitive differences among the senses. The activity provides students with a chance to think about how the world of perception, perception tests, perception differences, and perception tests are related to the world of perception. Students receive a preview of light's path and nature and receive a lesson 1.

Lesson 2: How does biology affect perception?
Students learn that perception is a biological process that begins with the stimulation of the eye and ending at the brain with a series of neural impulses. A color filter is introduced from the perspective of the eye's perception, and the lesson is a preview of the relationship between the eye and the brain in a biological eye. Students will use the concepts in lesson 1 to see the world of perception.

Lesson 3: How does the environment affect perception?
Students continue to explore factors for perception, moving from biological factors to social and physical environments. Students use real-world scenarios to explore the relationship between the eye and the brain. Students explore the relationship between the eye and the brain in a biological eye. Students will use the concepts in lesson 1 to see the world of perception.

Lesson 4: What are color and light?
Students continue to explore factors for perception, moving from biological factors to social and physical environments. Students use real-world scenarios to explore the relationship between the eye and the brain. Students explore the relationship between the eye and the brain in a biological eye. Students will use the concepts in lesson 1 to see the world of perception.



Step 1 – Review Materials

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

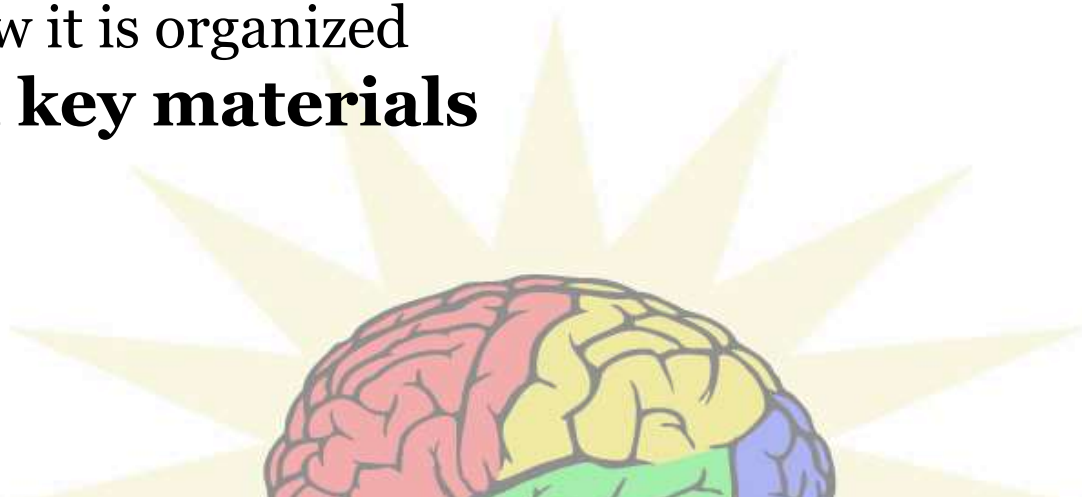
1. Review the rubric

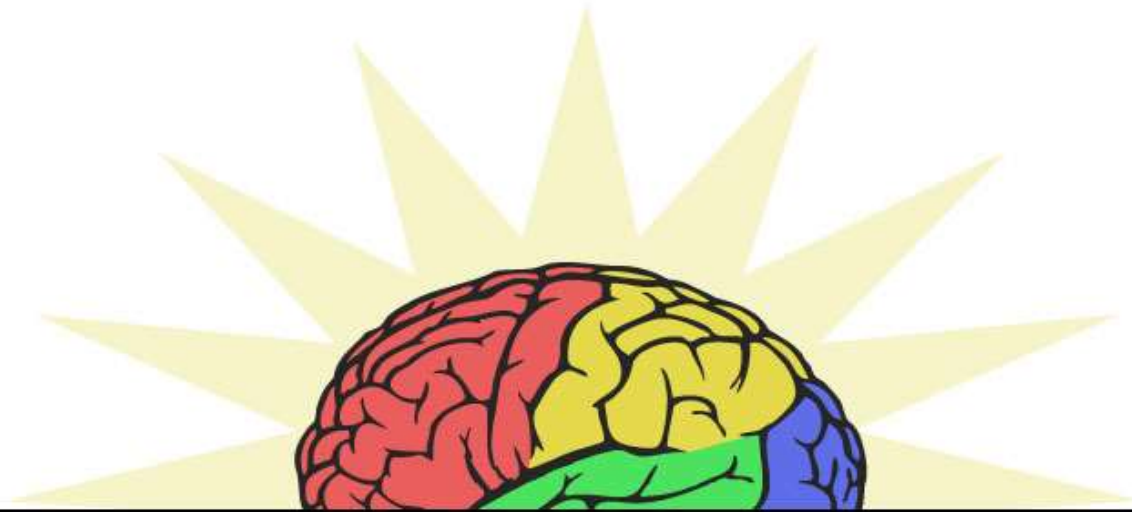
1. Record the grade and title of the lesson or unit

2. Scan to see:

1. What the lesson or unit contains
2. What dimension components are targeted: Examine the PEs found on ngss.nsta.org (or other NGSS site)
3. How it is organized

3. Read key materials





The EQulP Rubric

Step 2: Apply Category 1 Criteria

Identifying Targeted NGSS (Specific PEs or Dimensions)

To which aspect(s) in each of the dimensions is the lesson aligned?

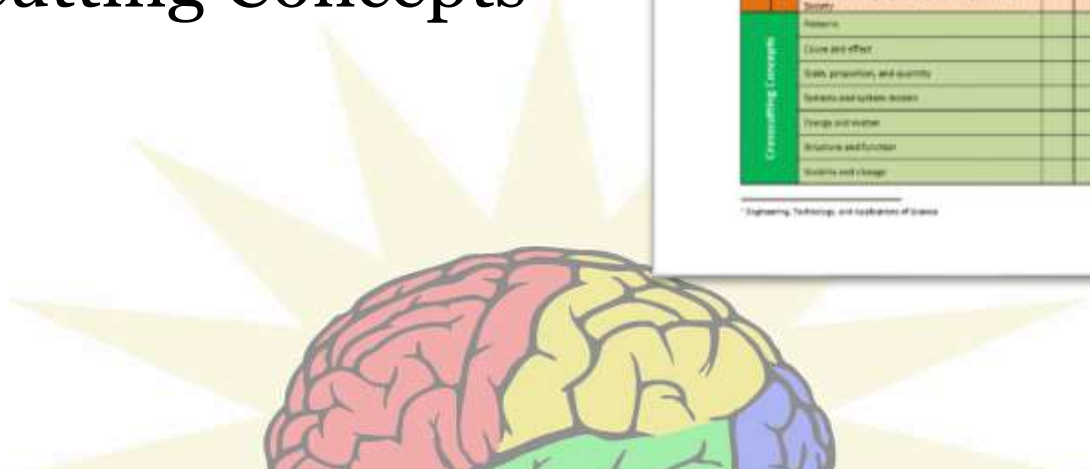
- Scientific Practices
- Disciplinary Core Ideas
- Crosscutting Concepts

Alignment to A Framework for K-12 Science Education and NGSS

Do you see what I see?
Light, sight, and natural selection

	L1	L2	L3	L4	L5	L6	L7
Science and Engineering Practices							
Asking questions and defining problems							
Developing and using models							
Planning and carrying out investigations							
Using arguments from evidence							
Using mathematics and computational thinking							
Constructing explanations and designing solutions							
Engaging in argument from evidence							
Obtaining, evaluating, & communicating information							
Disciplinary Core Ideas							
PS Matter and Its Interactions							
PS Matter and Stability: Atoms and Interactions							
PS Energy							
PS Waves and Their Applications in Technologies for Information Transfer							
LS From Molecules to Organisms: Structures and Processes							
LS Ecosystems: Interactions, Energy, and Dynamics							
LS Heredity: Inheritance and Variation of Traits							
LS Biological Evolution: Unity and Diversity							
ESS Earth's Place in the Universe							
ESS Earth's Systems							
ESS Earth and Human Activity							
ETS Engineering Design							
ETS Tools Among Engineering, Technology, Science, and Society							
Crosscutting Concepts							
Patterns							
Cause and Effect							
Scale, proportion, and quantity							
Systems and system models							
Energy and matter							
Structure and function							
Stability and change							

*Engineering, Technology, and Applications of Science



Step 2 – Apply Criteria in Category I: Alignment to the NGSS

Examine lesson through the “lens” of each criterion

1. Individually,

1. check each criterion for which *clear and substantial* evidence is found and
2. record the evidence and your reasoning

2. As a team, discuss

1. criteria for which clear and substantial evidence is found and
2. criterion-based suggestions for specific improvements that might be needed to meet criteria

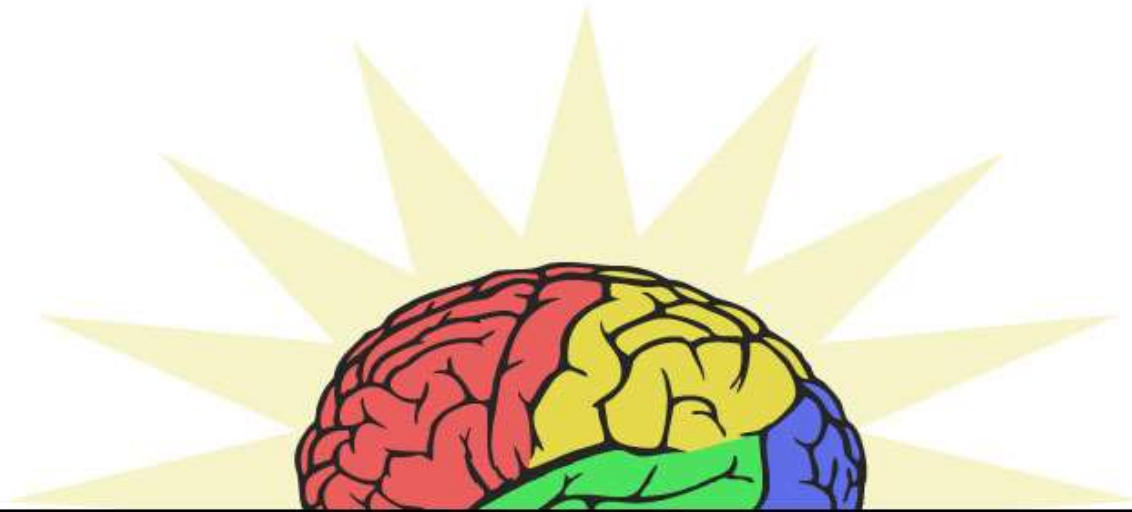


Stop and Ask...

- **Is this lesson aligned enough to the NGSS to warrant further examination?**

“If the lesson or unit is not closely aligned to the Next Generation Science Standards, it may not be appropriate to move on to the second and third categories. Professional judgment should be used when weighing the individual criterion.”





The EQulP Rubric

Step 3: Apply Category 2 & 3 Criteria

Step 3 – Apply Criteria in Categories II & III: Instructional Supports and Monitoring Student Progress

Examine the lesson through the “lens” of each criterion in the 2nd & 3rd categories

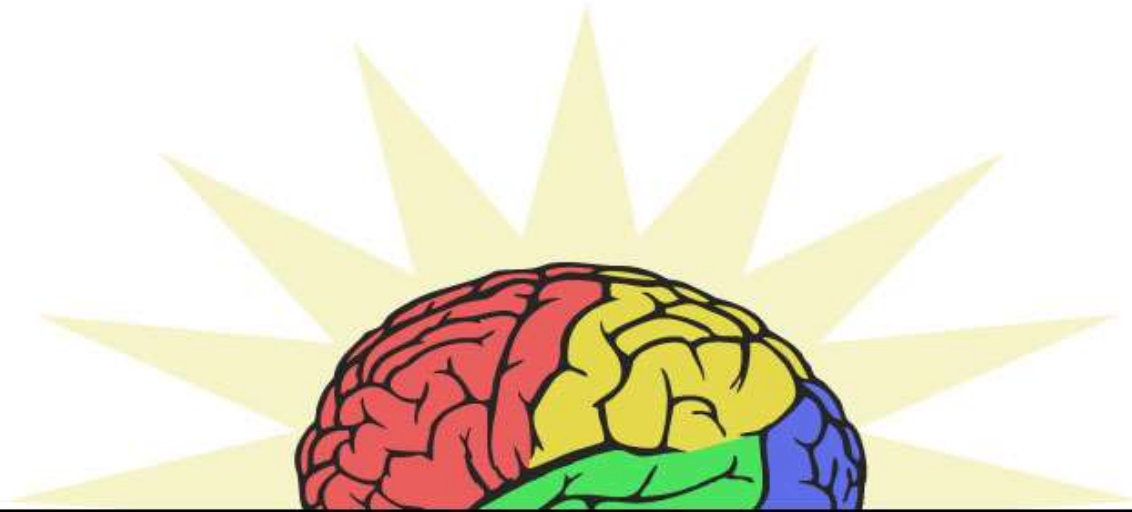
1. Individually,

1. check each criterion on the response form for which clear and substantial evidence is found and
2. record the evidence and reasoning

2. As a team, discuss

1. criteria for which clear and substantial evidence is found
2. criterion-based suggestions for specific improvements that might be needed to meet criteria.





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Share-out and Debrief

Share out

- To which aspect(s) of each dimension did the lesson most closely align?
- If you could suggest only one improvement (the best of several your group discussed), what would it be?



Activity Name	Old unit location		New unit location	
	Lesson	Activity	Lesson	Activity
Paint Chip Sorting	1	1	1	1
<u>NEW Initial Model of Color Perception</u>	NA	NA	1	2
Optical Illusions	1	2	NA	NA
Cow Eye Dissection	1	3	2	3
Colorblindness Test	1	4	2	1
Language and color video	NA	NA	3	1
Candy Sorting (Colorful Candies)	2	1	3	2
Spectrophotometer (Light emission, reflection, transmission, & absorption)	3	1-3	4	1-4
Hypothesis Development and Experimental Design	4	1	5	1 or Extension
Penny-Pecking Observations	4	2	5	Extension
Penny-Pecking Activity	5	1	5	Extension
<u>NEW Revised Model of Color Perception</u>	NA	NA	5	1
NEW Simulated Guppy Experiment	NA	NA	5	2
Connections to Model of Color Perception				
The Guppy Game	6	1	Same	Same
Advantage of Color Vision	7	1	Same	Same
Vision Adaptation	7	2	Same	Same
NEW Evolution of Color Vision in Mammals	NA	NA	7	3
<u>NEW Revised Model of Color Perception</u>				

More questions

- Do you feel like you have a better understanding of the EQuIP rubric than when you started?
- Do you have a curriculum on which you'd like to try using the EQuIP rubric?



Acknowledgements

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