



EQuIP for Science v3.0

MODULE

9

# Category III: Monitoring Student Progress



## Module 9: Category III: Monitoring Student Progress

Module 9 builds on Modules 6, 7, and 8 by having participants continue examining the Common Lesson, this time using the criteria in Category III: Monitoring NGSS Student Progress. As with all standards, teaching to the NGSS is not sufficient. It's about students learning. In the case of the NGSS, this should be three-dimensional learning. Examining a lesson or unit against the criteria in Category III determines whether a lesson or unit includes the kinds of assessments that allow all students to demonstrate understanding and that allow all teachers to monitor the progress and performance of all students.

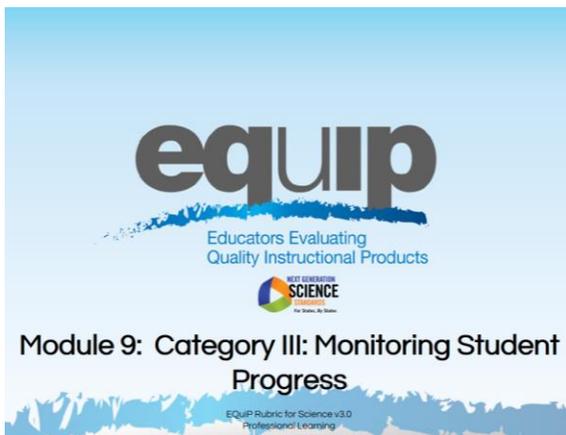
If the meeting participants are not going to continue on to Module 10 to examine additional lessons and units, consider pulling reflection questions and closing ideas from slides 197–199.

### Materials Needed

1. [Module 9 PowerPoint slides](#) or slides 173–189 of the [full PowerPoint](#)
2. [Handout 10: Module 9, Slide 180, “Formative Assessment Vignettes.”](#)
3. [Common Lesson: Urban Heat “Final” Version](#)\*
4. [Handout 7: Module 4, “EQuIP Rubric, Version 3.0”](#)\* or a computer or tablet with the electronic version of the rubric (At least one person per table should record their group's findings electronically.)

\*Introduced in a previous module.

## Introduction to Module 9



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How will we know if students are learning?



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### Talking Points

- In this module, we'll be looking at Category III: Monitoring NGSS Student Progress.
- By the conclusion of this module, you should be able to use the EQUIP Rubric to determine whether a lesson or unit includes a variety of assessments that align to three-dimensional learning and provides multiple opportunities to elicit observable, unbiased evidence of student understanding through performance.

## EQiP Rubric

I. NGSS 3D Design	II. NGSS Instructional Supports	III. Monitoring NGSS Student Progress
<p>The lesson/unit is designed so students make sense of phenomena and/or design solutions to problems by engaging in student performances that integrate the three dimensions of the NGSS.</p> <p><b>A. Establishing Phenomena/Designing Solutions:</b> Making sense of phenomena and/or designing solutions to a problem drive student learning.</p> <ol style="list-style-type: none"> <li>Student questions and prior experiences related to the phenomenon or problem enhance sense-making and/or problem solving.</li> <li>The focus of the lesson is to support students in making sense of phenomena and/or designing solutions to problems.</li> <li>When engineering is a learning focus, it is integrated with developing disciplinary core ideas from physical, life, and/or earth and space sciences.</li> </ol> <p><b>B. Three Dimensions:</b> Builds understanding of multiple grade-appropriate elements of the science and engineering practices (SEPs), disciplinary core ideas (DCIs), and crosscutting concepts (CCCs) that are deliberately selected to aid student sense-making of phenomena and/or designing of solutions.</p> <ol style="list-style-type: none"> <li>Provides opportunities to develop and use specific elements of the SEPs.</li> <li>Provides opportunities to develop and use specific elements of the DCIs.</li> <li>Provides opportunities to develop and use specific elements of the CCCs.</li> </ol> <p><b>C. Integrating the Three Dimensions:</b> Student sense-making of phenomena and/or designing of solutions requires student performances that integrate elements of the SEPs, DCIs, and CCCs.</p>	<p>The lesson/unit supports three-dimensional teaching and learning for ALL students by placing the lesson in a sequence of learning for all three dimensions and providing support for teachers to engage students.</p> <p><b>A. Relevance and Authenticity:</b> Engages students in authentic and meaningful scenarios that reflect the practice of science and engineering as experienced in the real world.</p> <ol style="list-style-type: none"> <li>Students experience phenomena or design problems as directly as possible ( firsthand or through media representations).</li> <li>Includes suggestions for how to connect instruction to the students' home, neighborhood, community and/or culture as appropriate.</li> <li>Provides opportunities for students to connect their explanation of a phenomenon and/or their design solution to a problem to questions from their own experience.</li> </ol> <p><b>B. Student Ideas:</b> Provides opportunities for students to express, clarify, justify, interpret, and represent their ideas and to respond to peer and teacher feedback orally and/or in written form as appropriate.</p> <p><b>C. Building Progressions:</b> Identifies and builds on students' prior learning [a] <b>three dimensions</b>, including providing the following support to teachers:</p> <ol style="list-style-type: none"> <li>Identify identifying prior student learning expected for all three dimensions.</li> <li>Clearly explain how the prior learning will be built upon.</li> </ol> <p><b>D. Scientific Accuracy:</b> Uses scientifically accurate and grade-appropriate scientific information, phenomena, and representations to support students' three-dimensional learning.</p> <p><b>E. Differentiated Instruction:</b> Provides guidance for teachers to support differentiated instruction by including:</p> <ol style="list-style-type: none"> <li>Appropriate reading, writing, listening, and/or speaking alternatives (e.g., translations, picture support, graphic organizers, etc.) for students who are English language learners, have special needs, or read well below the grade level.</li> <li>Extra support (e.g., phenomena, representations, tasks) for students who are struggling to meet the targeted expectations.</li> </ol>	<p>The lesson/unit supports monitoring student progress in all three dimensions of the NGSS so students make sense of phenomena and/or design solutions to problems.</p> <p><b>A. Monitoring 3D student performances:</b> Elicits direct, observable evidence of three-dimensional learning; students are using practices with core ideas and crosscutting concepts to make sense of phenomena and/or design solutions.</p> <p><b>B. Formative:</b> Embeds formative assessment processes throughout that evaluate student learning to inform instruction.</p> <p><b>C. Scoring guidelines:</b> Includes aligned rubrics and scoring guidelines that provide guidance for interpreting student performance along the three dimensions to support teachers in (a) planning instruction and (b) providing ongoing feedback to students.</p> <p><b>D. Unbiased tasks/items:</b> Assess student proficiency using methods, vocabulary, representations, and examples that are accessible and unbiased for all students.</p>

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### Talking Points

- Now, locate Category III on page twelve of your rubric document.
- Category III: Monitoring NGSS Student Progress focuses on examining lessons and units to determine whether they include the kinds of assessments necessary to assess student mastery of the NGSS accurately.
- Take a few minutes to read through Category III. *[Note to facilitator: Allow three to five minutes.]*



### Monitoring Progress in a Lesson or Unit

- Monitoring 3D student performances: Direct, observable evidence of three-dimensional learning
- Embedded formative assessments
- Rubrics and scoring guidelines
- Accessible and unbiased assessment methods

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### Talking Points

- The four criteria at the top of Category III focus on monitoring student NGSS progress in a lesson or unit.
- We've focused extensively on direct, observable evidence of three-dimensional learning; but before we can examine lessons or units to look for evidence of embedded formative assessments, we need to determine just what that looks like.

## Formative Assessment



### What Does Formative Assessment Look Like?

Formative assessment is a process used by teachers and students during instruction that provides feedback to adjust ongoing teaching and learning to improve students' achievement of intended instructional outcomes.



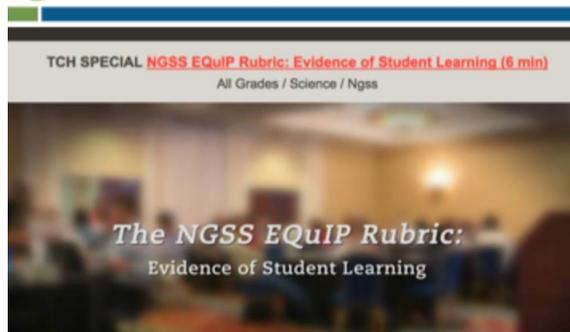
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### Talking Points

- According to a paper initiated by the Council of Chief State School Officers (CCSSO) in 2008 entitled, “Formative Assessment: Examples of Practice,” formative assessment is:
  - A process used by teachers and students during instruction that provides feedback to adjust ongoing teaching and learning to improve students' achievement of intended instructional outcomes.
- Dylan Wiliam, who you may recall co-authored “Inside the Black Box,” the groundbreaking research report on the impact of formative assessment on student learning, says this about formative assessment in his 2011 book, “Embedded Formative Assessment”:
  - “An assessment functions formatively to the extent that evidence about student achievement is elicited, interpreted, and used by teachers, learners, or their peers to make decisions about the next steps in instruction that are likely to be better, or better founded, than the decisions they would have made in absence of that evidence.” (43)



### Evidence of student learning



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## Facilitator Notes

This video can be found at <http://www.nextgenscience.org/resources/ngss-equip-rubric-evidence-student-learning>

## Talking Points



- This video highlights category 3 of the EQiP rubric: Monitoring student progress.
- Let's watch this video to better understand how we may approach looking for direct observable evidence of 3D student learning in a lesson.
- *Note to Facilitator: After the video Ask participants: "How can the features of the NGSS offer ways to make student thinking visible?" Have a brief discussion (1–2 minutes).*

**What Does Formative Assessment Look Like?**

- Learning Progressions
- Learning Goals and Criteria for Success
- Descriptive Feedback
- Self- and Peer-Assessment
- Collaboration

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Education Evaluating  
Quality Instructional Products

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## Talking Points

- According to the CCSSO paper, five attributes are associated with effective formative assessment:
  - *[Note to facilitator: Click for animation.]* **Learning Progressions** that clearly articulate the sub-goals of the ultimate learning goal [for a lesson or unit];
  - *[Note to facilitator: Click for animation.]* **Learning Goals and Success Criteria** that are clearly identified and communicated to students;
  - *[Note to facilitator: Click for animation.]* **Descriptive Feedback** provided to students that is evidence-based and linked to the intended instructional outcomes and criteria for success;
  - *[Note to facilitator: Click for animation.]* **Self- and Peer-Assessment** that provide students with opportunities to think meta-cognitively about their learning; and
  - *[Note to facilitator: Click for animation.]* **Collaboration** exemplified by a classroom culture in which teachers and students are partners in learning.



## Examples/Non-Examples

Is there evidence of:

- A learning progression?
- Learning goals and success criteria?
- Intent to provide descriptive feedback?
- Opportunity for self- and/or peer-assessment?
- Collaboration between teacher and students?



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### Facilitator Notes

Refer participants to [Handout 10, Module 9, Slide 180, “Formative Assessment Vignettes.”](#)

### Talking Points

- You have a handout entitled, “Formative Assessment Vignettes,” which you need to take out.
- Read through the different vignettes to determine what evidence you see of the five attributes delineated by CCSSO or evidence you see that supports William’s definition of formative assessment. Please note that the examples presented in the vignettes are not necessarily three-dimensional.
- Once you’ve read through the vignettes individually, discuss your findings as a group to determine which vignettes are examples of formative assessment and which are non-examples. *[Note to facilitator: These vignettes, as well as additional information about formative assessment, are available in the [paper from the Council of State School Officers](#). Allow seven to ten minutes.]*
- Now let’s take a look at these examples and non-examples.
- The first vignette is “Thumbs Up and Thumbs Down.” What do you think? Let’s see your thumbs up if you think this example provides evidence of formative assessment or thumbs down if you do not.
- What’s your reasoning? *[Note to facilitator: Allow one or two people to share.]*
- Here’s what the experts say about this first vignette: “This teacher is using a formative assessment approach to collect evidence to adjust instruction. This is, therefore, an instance of formative assessment.”
- Moving on to the second vignette, “Structured Pair Work,” again, let’s see your thumbs up if you think this example provides evidence of formative assessment or thumbs down if you do not.
- What’s your reasoning for this one? *[Note to facilitator: Allow one or two people to share.]*
- Here’s what the experts say about this second vignette: “This is an example of formative assessment where the posed questions and the peer conversations are used to elicit evidence of the students’ understandings. In this context, the formative assessment process is embedded into the learning activity itself due to the teacher’s careful engineering of the activity. The students are able to self-reflect and get feedback from their peers. The teacher is able to listen to the conversations between students to note the current level of understanding for the class and for individual students. The teacher uses the information immediately to assist students in their learning by redirecting thinking, reinforcing ideas or providing cues.”
- Now for the third vignette, “Classroom Quizzes,” again, let’s see your thumbs up if you think this example provides evidence of formative assessment or thumbs down if you do not.



- What’s your reasoning for this one? *[Note to facilitator: Allow one or two people to share.]*
- Here’s what the experts say about this third vignette: “This is not an example of formative assessment because the teacher does not use the evidence from the quizzes to adjust instruction, nor does the teacher provide direction to students for them to think meta-cognitively about their own learning. The only information the students receive is a score for the number of correct answers. This is an example of ongoing summative assessment, not formative assessment.”
- Continuing on to the fourth vignette, “Shared Thinking,” again, let’s see your thumbs up if you think this example provides evidence of formative assessment or thumbs down if you do not.
- What’s your reasoning for this one? *[Note to facilitator: Allow one or two people to share.]*
- Here’s what the experts say about this fourth vignette: “In this example of formative assessment the teacher is provided with information about student learning, and the process used to gather that information also requires students to reflect on their own learning. This activity provides the teacher with information about how well the students understand the concept and how best to demonstrate that understanding. To fully participate in the activity, students must reflect on their own level of understanding as they analyze the work of others and provide reasons why they think there are gaps in understanding.”
- Finally, for vignette number five, “District-Developed Assessments,” let’s see your thumbs up if you think this example provides evidence of formative assessment or thumbs down if you do not.
- What’s your reasoning for this one? *[Note to facilitator: Allow one or two people to share.]*
- Here’s what the experts say about this fifth vignette: “In this example, we see neither teachers’ adjustment of their instruction nor students’ adjustment of their learning tactics. Thus, this probably well-intentioned distribution of the monthly exams’ results to parents would constitute a counter-example of formative assessment.”
- So, determining whether evidence of embedded formative assessment is present in a lesson or unit is not easy. Misconceptions regarding what is and what is not formative assessment are common. Hopefully these examples and non-examples from the CCSSO document, along with the expert commentary, help identify some of the more common misconceptions and clarify what we’re looking for in terms of evidence of embedded formative assessment.

## Formative vs. Summative Assessment



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## Talking Points

- Overall, whether an assessment is formative or summative depends on the purpose for which that assessment is being used.
- As Wiliam states, “An assessment functions formatively to the extent that evidence about student achievement is elicited, interpreted and used by teachers, learners or their peers to make decisions about the next steps in instruction.”
- Summative assessments, on the other hand, are those whose purpose is evaluation. Summative assessments provide grades or scores denoting overall mastery of the material.

### Monitoring Progress in a Lesson or Unit

- Monitoring 3D student performances: Direct, observable evidence of three-dimensional learning
- Embedded formative assessments
- Rubrics and scoring guidelines
- Accessible and unbiased assessment methods



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## Talking Points

- As we prepare to look for evidence of the Category III criteria in an actual lesson, let’s quickly review criteria A through D for Category III.
- Keep in mind that you’ll be looking for direct, observable evidence of these criteria. This evidence must be explicitly stated in the lesson.

### Monitoring Progress in Units or Longer Lessons

- Coherent Assessment System: Pre-, formative, summative, and self-assessments that assess three-dimensional learning
- Multiple opportunities for students to learn and demonstrate performance



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## Talking Points

- The criteria at the bottom of Category III focus on monitoring student progress in a longer lessons or in a unit of instruction.
- Note that these criteria require multiple forms of assessment as well as multiple opportunities for students to demonstrate performance.
- Again, keep in mind that you're always looking for direct, observable evidence of these criteria.

## Monitoring Student Progress Practice

### Response Form, p. 12

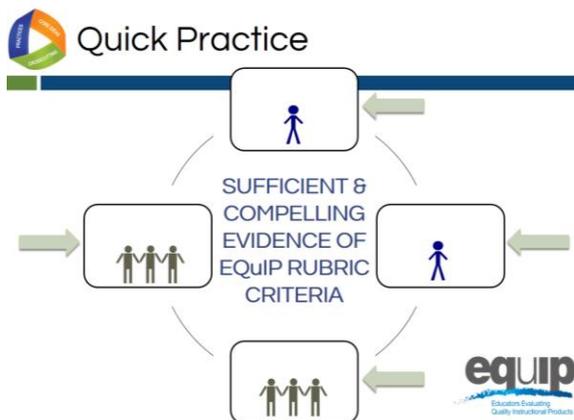
**Category III: Monitoring NGSS Student Progress (lessons and units)** The lesson/unit supports monitoring student progress in all three dimensions of the NGSS as students make sense of phenomena and/or design solutions to problems.

Lesson and Unit Criteria	Specific evidence from materials and reviewers' reasoning	Evidence of Quality?	Suggestions for Improvement
<b>A. Monitoring 3D student performance:</b> Elicits direct, observable evidence of three-dimensional learning; students are using practices with core ideas and crosscutting concepts to make sense of phenomena and/or to design solutions.		<input type="checkbox"/> None <input type="checkbox"/> Inadequate <input type="checkbox"/> Adequate <input type="checkbox"/> Extensive	
<b>B. Formative:</b> Embeds formative assessment processes throughout that evaluate student learning to inform instruction.		<input type="checkbox"/> None <input type="checkbox"/> Inadequate <input type="checkbox"/> Adequate <input type="checkbox"/> Extensive	
<b>C. Scoring guidelines:</b> Includes aligned rubrics and scoring guidelines that provide guidance for interpreting student performance along the three dimensions to support teachers in (a) planning instruction and (b) providing ongoing feedback to students.		<input type="checkbox"/> None <input type="checkbox"/> Inadequate <input type="checkbox"/> Adequate <input type="checkbox"/> Extensive	
<b>D. Unbiased tasks/Items:</b> Assesses student proficiency using methods, vocabulary, representations, and examples that are accessible and unbiased for all students.		<input type="checkbox"/> None <input type="checkbox"/> Inadequate <input type="checkbox"/> Adequate	

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## Talking Points

- For this quick practice you will need:
  - The response sheet for Category III, which is located on page twelve of your rubric document;
  - The Common Lesson *Urban Heat final version*; and
  - A pen, pencil, or a tablet or laptop with the electronic version of the rubric to record your findings.



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## Talking Points

- As you work through this category, follow the same process you used earlier when examining a lesson or unit for Categories I and II:
  - First, work individually to look for the evidence in the Common Lesson.
  - Use the Arabic and Roman numerals associated with the rubric criteria to code the evidence you locate.
  - Next, still individually, determine how the evidence fits together and connects to one or more criteria.
  - Once you've made your individual determinations, work with your group to share and compare the evidence you've located in the Common Lesson.
  - Then, as a result of this evidence and reasoning, collaboratively evaluate whether or not the lesson or unit provides sufficient and compelling evidence of the criteria, and assign evidence of quality ratings for each of the criteria as well as for each category.
  - Finally, make suggestions for how the lesson or unit might be improved.
- You have 30 minutes for this task. *[Note to facilitator: Set the timer, but monitor the groups to determine if they need more or less time to complete the practice before moving on.]*



## Debrief

- What evidence did you find to support the criteria for Category III?
- What makes you think this evidence is/is not sufficient and/or of the quality needed to meet the criteria for Category III?
- Why is it important to measure student understanding on all three dimensions of learning?



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## Talking Points

- So what determinations did you make at your tables? Does this lesson meet the criteria in Category III?
- How? Why or why not? *[Note to facilitator: Allow several tables to share.]*
- Why is it important to measure student understanding on all three dimensions of learning? *[Note to facilitator: Allow several tables to share.]*



## Let's Rate the Degree to which the criteria were met for Category III

- Unit Rating Scale for Category III (A-D only)
  - 3 At least adequate evidence for all criteria in the category, extensive evidence for at least one criterion.
  - 2 Some evidence for all criteria in the category and adequate evidence for at least 5 criteria, including A
  - 1 Adequate evidence for at least two criteria in the category
  - 0 Adequate evidence for no more than one criterion in the category



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### Talking Points

- Let's rate the degree to which the criteria were met in Category III.
- Let's only consider criteria A–D since we are examining a lesson, not a unit.
- At each table, let's review the evidence of quality for categories A–D. Then, as a group, let's determine a rating for Category III using the language on page 12 of the rubric.
- Notice that the possible ratings fall across a 0–3 scale.
- *Facilitator, give groups about 5 minutes to discuss evidence of quality for each category A–C and determine a Category rating.*
- By a show of fingers, would table facilitators indicate how many of the criteria you found at least adequate evidence of in the lesson? *[Note to facilitator: Do a quick summary of the room and announce a consensus response.]*
- Let's take a quick poll of the room, what rating did your group give to Category III? *[Note to facilitator: Quickly survey the room by asking for a response from each group, and discuss a consensus answer.]*
- Finally, would a few groups be willing to share specific evidence and reasoning for your evidence of quality rating? *[Note to facilitator: Take a few group volunteers.]*



## Overall Rating for Lesson/Unit

**Category Ratings:**  
Transfer your team's ratings from each category to the following chart and add the scores together for the overall rating.

Category I: NGSS 3D Design				Category II: NGSS Instructional Supports				Category III: Monitoring NGSS Student Progress				Total Score
0	1	2	3	0	1	2	3	0	1	2	3	

**Overall ratings:**

**E:** Example of high quality NGSS design—high quality design for the NGSS across all three categories of the rubric, a lesson or unit with this rating will still need adjustments for a specific classroom, but the support is there to make this possible; exemplifies most criteria across Categories I, II, & III of the rubric. (total score 16-20)

**E/I:** Example of high quality NGSS design if improved—adequate design for the NGSS, but would benefit from some improvement in one or more categories; most criteria met at least adequate evidence (total score 10-15)

**R:** Revision needed—Partially designed for the NGSS, but needs significant revision in one or more categories (total 7-10)

**N:** Not ready to review—not designed for the NGSS, does not meet criteria (total 0-3)

Circle the overall rating below:

E   E/I   R   N

Overall Summary Comments:



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## Facilitator Notes

If there is time available, have groups share their overall ratings and a comment after the 10-minute time allotted for this task.

## Talking Points

- Let's determine an overall rating and share summary comments.
- Let's turn to page 14 of our rubric, pictured on this slide.
- At our tables, let's review our ratings for categories I. *[Note to facilitator: click animation II, click animation and III click animation one at a time.]*
- As you look back at each category in the rubric and share the category rating, try to record at least one summary comment in the *Overall Summary Comments* for the category.
- Total your category ratings and reflect on the overall quality of the lesson and record your overall rating. *[Note to facilitator: Click animation.]*
- Notice that total scores of 8–9 are examples of high quality design.
- Scores of 6–7 are examples of high quality design if improved.
- Scores of 3–5 indicate that revision is needed since these lessons are only partially designed for the NGSS.
- Scores of less than 3 indicate that this lesson was not ready for review since it does not reflect NGSS Design.
- You will have ten minutes to complete this task.



## Concluding Slide for Module 9

### Module 9: Reflection

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How will we know if students are learning?



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#### Talking Points

- As with all standards, teaching to the NGSS is not sufficient. It's about students learning—in the case of the NGSS, three-dimensional learning. Examining a lesson or unit against the criteria in Category III determines whether that lesson or unit includes the kinds of assessments that allow all students to demonstrate understanding and for all teachers to monitor the progress and performance of all students.
- As a result of this module, you should feel comfortable using the rubric to determine whether or not a lesson or unit meets the criteria in Category III.
- Are there any questions or additional comments about the criteria in Category III? *[Note to facilitator: Address question or comments if they arise.]*
- You have now completed the first nine modules of this professional learning.
- You've applied the EQuIP Rubric criteria to examine a common lesson to determine whether this lesson contains evidence of sufficient quality to meet the criteria for:
  - NGSS 3D Design;
  - Instructional Supports; and
  - Monitoring NGSS Student Progress.
- Now that you've had practice with each category of the rubric separately, you're ready for the culminating task where you will put what you've learned into practice to examine a lesson or unit that has been developed for your grade, grade band and/or specific science discipline.
- *[Note to facilitator: Ask each of the following questions one at a time, allow participants to answer, and provide follow up as needed before proceeding to the culminating task.]*
  - Do you feel ready to use the EQuIP Rubric to examine NGSS instructional materials?
  - What have been the strengths of the training?
  - Is there anything you need to review or revisit before the culminating task?