EQuIP-ped for Success

A rubric to help implement the Next Generation Science Standards

Molly Ewing

The Educators Evaluating the Quality of Instructional Products (EQuIP) Rubric for science is a new tool for science educators that provides criteria by which to examine the alignment and overall quality of lessons and units with respect to the *Next Generation Science Standards (NGSS)*. The rubric criteria are divided into three categories: alignment to the *NGSS*, instructional supports, and monitoring student progress. The purposes of the rubric and review process are to: (1) review existing lessons and units to determine what revisions are needed; (2) provide constructive, criterion-based feedback and suggestions for improvement to developers; (3) identify exemplars/models for teachers' use within and across states; and (4) inform the development of new lessons and units. The rubric is currently being used more to review existing lessons and determine what revisions are needed, provide feedback, and inform the development of new lessons than it is to identify exemplars. But as more materials are created and revised, the rubric will be increasingly used for this purpose. A sample of a rubric section used to assess alignment to the *NGSS* appears on page 15.

I have had the privilege of helping coordinate the development of the EQuIP rubric for science—which included working with state teams, teacher focus groups, the National Science Teachers Association, and others—and of using the tool with many educators since it was released in April and updated this fall. I'd like to share some reflections on these experiences and on the tool itself.

Transitioning materials to the Next Generation Science Standards

Implementing the *NGSS* will require shifts in many of the instructional materials educators have access to. Most of the educators I have worked with believe the shift to three-dimensional learning—the practices, disciplinary core ideas, and crosscutting concepts working together to support students in learning—will be the biggest and most important in terms of materials.

Educators who have a strong understanding of the *Framework for K–12 Science Education* and the *NGSS* are ready and excited to discuss if materials support students in three-dimensional learning. In discussions of whether dimensions work together, I have started sharing contrasting examples—one from my own teaching experience in which the practices and core ideas were isolated from one another and the other example in which the practices and core idea do work together. A typical lesson for me included direct teaching of core ideas and then asking students to create a model. This is not an example of the practice of modeling and core ideas working together to further students' understanding of both. The model in this example was an assessment, a way for me as the teacher to see what the students understood after instruction. For the most part, students were not learning any more by making a model. Instead, they were creating a representation of what they heard me say.

In contrast, we see examples of materials that start a unit of study by presenting students with a particular phenomenon and asking them to develop a model of what they think is happening. Through the unit they continue to revise their model to account for new phenomena they encounter, eventually ending up with a model that can explain a variety of phenomena. In this example, students are using a model to make their thinking visible to themselves, and by doing this, they are furthering their understanding of both the core idea at hand and of modeling itself.

In working with educators with the EQuIP rubric, most of the lessons and units they brought to examine were developed before the *NGSS* were completed. The handful of materials examined that were developed after the *NGSS* were not created with the rubric in mind. As a result, many criteria on the rubric cannot be checked for some of the materials under review. This should not be seen as the materials failing, but rather as an opportunity to think about how to transition the materials we have now to the materials we will need in the future, using the rubric as a guide. I have heard this described as the bridge to the *NGSS*, and that the bridge is longer for some materials than others. A comment that is often made when groups discuss next steps is that all of their materials do not need to be transitioned immediately. It is important to them to move at the pace it takes to do the work well. Additionally, they recognize that the materials that will

work for them during the first year of implementation may not look the same as the materials they will use several years into implementation.

Critical ideas in this rubric

While three-dimensional learning may be seen as the biggest shift needed for materials, there are some other critical ideas in the rubric that have made for interesting discussions among educators using the tool. For example, there is a strong focus in the rubric on explaining phenomena and designing solutions to problems. Rubric users seem to appreciate this focus, likely because we have all seen lessons or units in which the students are asked to do something simply to do it. It is hard for students to gain an appreciation for science and engineering when they aren't asked to do what scientists and engineers do: to answer questions, explain phenomena, and solve problems. Additionally, the language of the rubric is focused on what opportunities materials provide to students—on what they are being asked to do. The practices, for example, are not discussed as teaching strategies but as something students are to engage in along with the core ideas and crosscutting concepts.

Another idea represented in the rubric is that instructional materials should be building toward a bundle of performance expectations. To be able to say that any given lesson is fully aligned to performance expectations is very unlikely. Rather, a lesson is more likely to be aligned to parts of the performance expectations—to the elements of the three dimensions. This is mostly what we look at when using the rubric—where the three dimensions are working together in lessons and units—but it is important not to lose sight of the forest for the trees, which is why coherence is also addressed in the rubric. If we only ever consider the small pieces that make up a lesson, it is very possible to end up with a bunch of disconnected lessons that do not support students in being able to demonstrate their understanding of the performance expectations at the end of instruction. Each lesson should serve a specific purpose and should fit together with other lessons to create a bigger, coherent story for students.

Finally, it is important to consider the grade-appropriateness of the practices and crosscutting concepts. We often just say that students are engaged in a practice like Planning and Conducting an Investigation or are discussing a crosscutting concept like Cause and Effect without much consideration for whether they are doing these things in a grade-appropriate way. If we never discuss what grade-appropriate modeling looks like, for example, we run the risk of having students only ever model in middle school the same way they did in elementary school; they will not be exposed to or engaged in the progression of each practice and crosscutting concept. Because this focus on grade-appropriateness is in the rubric, I have seen rubric users shift from discussing the practices and crosscutting concepts in a generic way to discussing them in specific, grade-level ways. More information about the progressions of the practices and crosscutting concepts can be found in the *Framework* (NRC 2012), Appendixes F and G of the *NGSS* (NGSS Lead States 2013), and soon-to-be-released evidence of students' performance or evidence statements.

Using the NGSS EQuIP Rubric to facilitate discussions and generate feedback

Equally important to the rubric is the review process—the opportunity to sit down with colleagues and examine materials using the rubric. The rubric and review process require users to identify evidence of the criteria in the materials before evaluating the lesson and making suggestions for improvement. This can be surprisingly difficult, especially when examining a lesson or unit we have used in our classrooms before. In this situation, we often read into the lesson or unit things that are not actually there or miss things that are. It is important that, as a review group, we begin by only discussing what is in the lesson or unit—what can be pointed to, highlighted, cited, and so on. Only after taking accurate account of what is or is not in the lesson can we make an accurate evaluation and appropriate suggestions for improvement.

Educators are able to push their own and each other's understanding of the *NGSS* and what high-quality, aligned materials look like by using the rubric as a group. Educators have shared how much they appreciate the opportunity to be able to have thoughtful conversations with their fellow education professionals. And I have been lucky enough to listen in on many of these conversations—I continue to learn more about the *NGSS* and materials through every discussion.

Please visit *www.nextgenscience.org/resources* to learn more about the rubric and other tools for implementation. Materials to support the use of the rubric are continuing to be developed and will be added to this page as they are completed. Please feel free to contact me with questions about the rubric at the e-mail address provided at the end of this article. ■

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References

National Research Council (NRC). 2012. *A framework for K–12 science education: Practices, crosscutting concepts, and core ideas.* Washington, DC. National Academies Press.

NGSS Lead States. 2013. *Next generation science standards: For states, by states.* Washington, DC. National Academies Press. *www.nextgenscience.org/next-generation-science-standards.*

EQuIP Rubric.

The lesson or unit aligns with the conceptual shifts of the *NGSS*:

Criteria	Specific evidence from materials and reviewers' reasoning	Suggestions for improvement
A. Grade-appropriate elements of the science and engineering practice(s), disciplinary core idea(s), and crosscutting concept(s), work together to support students in three-dimensional learning to make sense of phenomena and/or to design solutions to problems.		
i. Provides opportunities to develop and use specific elements of the practice(s) to make sense of phenomena and/or to design solutions to problems.		
ii. Provides opportunities to develop and use specific elements of the disciplinary core idea(s) to make sense of phenomena and/or to design solutions to problems.		
iii. Provides opportunities to develop and use specific elements of the crosscutting concept(s) to make sense of phenomena and/or to design solutions to problems.		
iv. The three dimensions work together to support students to make sense of phenomena and/or to design solutions to problems.		

A unit or longer lesson will also:

Criteria	Specific evidence from materials and reviewers' reasoning	Suggestions for improvement
B. Lessons fit together coherently targeting a set of performance expectations.		
i. Each lesson links to previous lessons and provides a need to engage in the current lesson.		
ii. The lessons help students develop proficiency on a targeted set of performance expectations.		
C. Where appropriate, disciplinary core ideas from different disciplines are used together to explain phenomena.		
D. Where appropriate, crosscutting concepts are used in the explanation of phenomena from a variety of disciplines.		
E. Provides grade-appropriate connection(s) to the *Common Core State Standards* in Mathematics and/or English Language Arts & Literacy in History/Social Studies, Science and Technical Subjects.		

The rubric criteria are divided into three categories: alignment to the *NGSS*, instructional supports, and monitoring student progress. Above is the feedback form for Category I: Alignment to the *NGSS*.