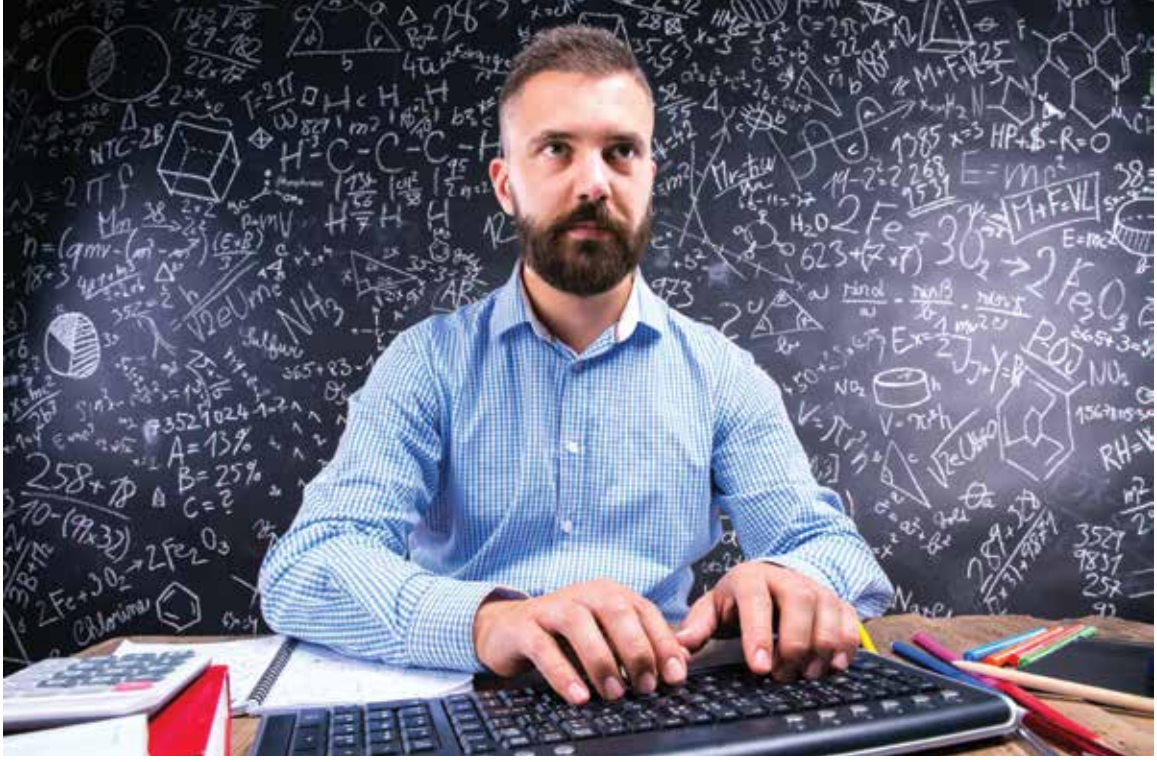

Crafting a Masterpiece

Use the EQuIP Rubric to transform your teaching

Mike Fumagalli

Recently, my wife and I bought a new dishwasher, and I decided to install it myself (with help from how-to videos on YouTube). After laboriously removing the old machine—which involved two trips to the hardware store—I was ready to go. I turned the new dishwasher on its back to detach a wooden shipping frame. The instructions noted that the job called for a 15/16 in. socket. My heart sank. I didn't have one. So, back to the hardware store I went, in search of the right tool.

Many science teachers are installing the proverbial new dishwasher in their classrooms. Facing state assessments, new standards, and instructional shifts, teachers are often left with the DIY ("do it yourself") version of science teaching. Unfortunately, answering the question "What does quality science instruction look like in the classroom?" isn't as easy as watching a few videos online. Fortunately, the EQuIP (Evaluating the Quality of Instructional Products) Rubric for Science (see "On the web") answers that question. It provides specific criteria for determining alignment to the *Next Generation Science Standards* (NGSS Lead States 2013).

While trying to understand the *NGSS* was, at first, like feeling my way through a dark room, professional learning opportunities dramatically boosted my understanding. In 2014, I attended an EQuIP Rubric workshop for *NGSS* adopting states. Then I worked with 10 colleagues (facilitated by Achieve, Inc.) to provide feedback on what would become the *NGSS* EQuIP Professional Learning Facilitator's Guide (see "On the web"). During this past year, I've used this guide to help train educators on how to revise their instructional materials. I also worked with a team of science educators developing EQuIP-reviewed lessons and rubrics that are now available online (see "On the web"). The best thing I got from all this was the EQuIP Rubric itself, which, like the 15/16 in. socket, was exactly the tool I needed.

Quick startup guide

At first glance, the EQuIP Rubric may be overwhelming, but approached strategically, it provides unparalleled clarity about how the *NGSS* classroom differs from traditional student experiences. Based on my experience as a classroom teacher and a *NGSS* and EQuIP Rubric learning facilitator, I prepared this "Quick Startup" guide for using the rubric to help you revise lessons and units.

Be fearless

The rubric is divided into three categories:

- Alignment to the *NGSS,*
- Instructional Supports, and
- Monitoring Student Progress.

The detail provided can be intimidating, so focus on one category at a time. Category I establishes criteria for three-dimensional learning—a primary innovation of the *NGSS*. Category II focuses on instructional supports necessary for students to access phenomena and make relevant connections to personal experiences that influence a progression of learning over time. Category III emphasizes the use of formative assessment to inform instructional adjustments.

The criteria within each category provides you, as the teacher, with specific pieces of the puzzle needed to create meaningful, engaging opportunities for students to explain phenomena and design solutions to problems. The rubric requires you to look critically at lessons and identify explicit evidence of where the dimensions are present and work together to build toward a set of performance expectations.

Be reasonable

When evaluating lessons using the rubric, attack two or three at a time. To revise an entire semester of chemistry or biology at once is unmanageable and will result in frustration. Choose a sequence of two or three of your favorite lessons that can inspire you to persevere through rough patches. (Working with just a single lesson, though easier, will pose challenges when looking for evidence of coherence within a learning progression.)

Be intentional

Look in your lessons for explicit evidence—or lack thereof—of places where students must use the three dimensions (science and engineering practices [SEPs], disciplinary core ideas [DCIs], and crosscutting concepts [CCCs]) collectively to make sense of phenomena or design solutions to problems. This innovation is critical to the *NGSS*. For example, merely using $p = mv$ to calculate linear momentum on a worksheet is unlikely to invest students in the task. However, developing an explanatory model of what occurs before, during, and after a car collision will prompt students to ask meaningful questions and construct explanations of how something occurs in the natural world.

Students still will need to use data-collection instruments, such as commercially available cart and track dynamics systems, to figure out how momentum is conserved in a system when two cars collide. However, students will be much more engaged when phenomena are compelling to figure out and explain, as opposed to doing a laboratory procedure for confirmatory purposes. In each lesson, they should be using a disciplinary core idea to explain a phenomenon. If they aren't, the lesson requires revision.

Be honest (with yourself and others)

The innovations of the *NGSS* are demanding. Evidence of meeting these demands can be seen and pointed to in the lesson. When identifying evidence that the dimensions are present in your lessons, consult Appendixes F and G of the *NGSS*. The bulleted elements provide specific descriptions of what students do when using the dimensions to make sense of phenomena or design solutions to problems. Being clear on what those practices and crosscutting concepts look like in the classroom will help you identify strengths and weaknesses in a lesson and whether students are building their learning over time. Stating and defending that dimensions are present when they aren't only impedes the development of high-quality instructional materials for your students. Implied use of the dimensions is not the goal.

Be a team

The concept of the EQuIP Rubric is grounded in having teams of teachers collaborate to analyze and revise lessons. However, if such collaboration is unrealistic due to time constraints, you can still use the EQuIP Rubric individually to look closely at your lessons and identify areas for improvement. While much of my experience with the EQuIP Rubric has come in teams, immersion in the tool has enabled me to look critically at my own lessons, often without the rubric in front of me.

Conclusion

With the growing, nationwide need for professional learning about the *NGSS*, the ability to discern which lessons and units align with the *NGSS* is critical. Revising lessons and units away from traditional lecture-to-lab experiences and toward the innovations of the *NGSS* requires a highly calculated approach with the right tool.

You've often heard of teaching referred to as an "art," requiring an artist's focus and attention. As teachers, we call on a variety of strategies and experiences just as painters have many paintbrushes, each with its own purpose. You won't find an artist painting with a hammer, because it's the wrong tool likely to create nothing but a mess. But using the right tool, for teachers just as with artists, can result in a masterpiece, providing engaging lessons and units that present science as a continually evolving endeavor, transforming the world for generations to come. ■

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On the web

EQuIP Reviewed Lessons: *www.teacherstryscience.org/ngsslanding*
NGSS EQuIP Professional Learning Facilitator's Guide: *http://bit.ly/1TWm2Rl*
EQuIP rubric: *http://ngss.nsta.org/Documents/BasicEQuIP.pdf*

Reference

NGSS Lead States. 2013. *Next Generation Science Standards: For states, by states.* Washington, DC: National Academies Press.