

Seeing Students Learn Science: Integrating Assessment and Instruction in the Classroom

Children are natural explorers and their observations and intuitions about the world around them serve as the foundation for science learning. Many science educators are changing their approach to instruction to take advantage of those attributes, seeking to ensure that students have the chance to “do” science for themselves in ways that harness their natural curiosity and understanding of the world.

Just as science instruction is changing, science assessments are also changing. Traditional assessments were not designed to measure the full range of activities and interactions that are unfolding in science classrooms today. A 2014 report from the National Academies of Sciences, Engineering, and Medicine, *Developing Assessments for Next Generation Science Standards*, presented a detailed synthesis of the innovative work of many researchers and practitioners who have developed a variety of assessments to meet this challenge.

A new book from the National Academies, *Seeing Students Learn Science: Integrating Assessment and Instruction in the Classroom*, brings that research to the classroom. It describes the ideas science educators can use right now to incorporate new assessment thinking into instructional practice—and that principals, district administrators, and pre- and in-service providers can use to support teachers.

Seeing Students Learn Science: Integrating Assessment and Instruction in the Classroom is organized around key questions educators have about the new types of assessments.

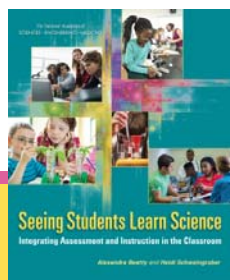
What’s really different? Gives a quick overview of how ideas about science learning and instruction have changed and why different kinds of assessments are needed.

What does this kind of assessment look like? Highlights a few examples to see how these ideas and principles work in practice.

What can I learn from my students’ work? Looks more deeply at the information educators can obtain from a variety of assessments—and how they provide evidence of students’ thinking.

How can I build new kinds of assessments into the flow of my instruction? Describes ways to adapt assessments already in use and to design new assessments that support the changes science teachers are making in instruction.

How can I work with others in my school, district, and state? Focuses on how teachers can connect with developments outside of the classroom, and explores assessment systems, ways of reporting assessment results, and assessment for monitoring purposes.



Available at <https://www.nap.edu/23548>

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in the Classroom

The National Academies of
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Key Insights from *Seeing Students Learn Science*

SCIENCE INSTRUCTION IS DIFFERENT TODAY, BUT ASSESSMENTS HAVE NOT KEPT PACE

Science instruction today emphasizes three-dimensional learning, in which students are expected to make connections among core ideas, crosscutting concepts, and scientific practices. Just as this kind of instruction does not focus solely on isolated ideas or skills, neither should assessments. In today's science classroom, active and engaged learning naturally provides many opportunities to observe and record student learning. New assessments—that look more like classroom activities and better measure the full range of learning happening in science classrooms—are needed to integrate assessment practices and instruction.

EDUCATORS CAN IMPLEMENT NEW ASSESSMENTS IN THEIR CLASSROOMS RIGHT NOW

Next-generation classroom science assessments should be part of a new assessment system that includes different types of assessments for different purposes. Although transitioning to a new assessment system will be a gradual process, change begins at the classroom level and individual educators can begin to put new approaches into practice right away. *Seeing Students Learn Science* is filled with examples of innovative assessment formats, strategies to embed assessments in classroom activities, and ideas for interpreting and using information from these assessments. It also provides ideas and questions that educators can use to reflect on what they can adapt right away—and what they can work toward over time—to ensure that instruction drives assessment, not the other way around.

EDUCATORS CAN LEAD THE WAY IN TRANSFORMING SCIENCE ASSESSMENT

New assessments should be an integral part of an overall science education system focused on supporting the success of students and science teachers. This transition may be a complicated one for states and districts and will likely pose challenges that will take time to solve. Individual educators, though, can lead the way in adapting assessment practices to new approaches to science instruction. With adequate professional development support, and the resources provided in *Seeing Students Learn Science*, educators can begin to redesign assessments in their own classrooms and champion new approaches in their schools and districts.

Who can use *Seeing Students Learn Science: Integrating Assessment and Instruction in the Classroom*?

Educators can use the case studies and sample lessons in *Seeing Students Learn Science* to create and implement assessments in their own classrooms.

Principals, district administrators, and pre- and in-service providers can support teachers by using the book as a guide to implement best practices and strategies.

HOW DO I BEGIN TO IMPLEMENT HIGH-QUALITY SCIENCE ASSESSMENTS IN MY CLASSROOM TODAY?

The ideas outlined in *Seeing Students Learn Science* can empower you to work with your colleagues and start incorporating new assessment thinking into your instructional practice right now.

- **How do I use less structured activities, like small group work or discussions, as assessments?** The “Behavior of Air” case study shows how you can use a discussion on the nature of matter for both instruction and assessment. (Pages 3-1 to 3-4)
- **How do I score and evaluate my students’ work from these assessments?** Read the “Measuring Silkworms” case study to learn how you can structure a rubric around a data collection activity. (Pages 3-5 to 3-8)
- **How do I use a classroom task to assess where a student needs help?** The “Biodiversity in the Schoolyard” case study illustrates how you could use a discussion question to either see if your students can use observation and evidence to explain biodiversity—or to assess their understanding of the concept. (Pages 2-5 to 2-7)
- **How do I use different instructional strategies to assess my students’ understanding?** The “Movement of Water” case study explores how you can use technology (or even a simple show of hands) to assess your students’ knowledge of science concepts. (Pages 4-4 to 4-6)
- **How do I develop assessments that reflect the diversity of my classroom?** Explore sample strategies that enable you to link assessment to the diverse experiences that students bring from their homes and communities. (Pages 5-4 to 5-6)

You don’t have to do this alone! Professional learning communities empower educators to share ideas, resources, and experiences around adapting assessments to instructional practices. (Pages 5-5 to 5-7)

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