



NGSS and College and Career Readiness

By Michael R. Heithaus, PhD

Improving STEM education at every level—from K–12 through university—is a national priority. Distinction in STEM fields is critical to ensuring the ability of the United States to compete in international markets and to actualize intellectual goals, and jobs in STEM fields are projected to grow at higher rates than in other professions. Yet at the university and career levels, there is seemingly not enough interest or achievement in STEM fields. How we prepare students for college and career is a growing concern. The Next Generation Science Standards are built to ensure readiness.

What Is College and Career Readiness?

At the simplest level, being college ready means that students are able to succeed in college classes without remediation. Being career ready means that graduates are prepared to obtain and succeed in entry-level positions. Sounds simple, but as STEM fields evolve and change, so do requirements related to content-area knowledge. For that reason, NGSS and *HMH Into Science* focus on students demonstrating that they have mastered important skills more than specific knowledge or facts. Through formative assessments, Gather Data prompts, and summative assessments, including critical performance-based assessments, teachers are supplied with the tools they need to understand student performance.

When students have mastered skills and understand the underlying connections between STEM fields and other curriculum areas, they will not only have the background knowledge they need but also be prepared to fill in gaps in their understanding independently, without the need for remediation or extensive on-the-job training. And although college and career readiness might seem like qualities for students to master in high school, NGSS brings a greater coherence across grade levels: students from primary grades through high school have the opportunity to work on these skills and learn to apply them in everyday life.

According to the NGSS, career and college-ready students should be able to

- make sense of the world and approach novel problems, phenomena, and information using a blend of science and engineering practices, disciplinary core ideas, and crosscutting concepts
- use valid research strategies
- be self-directed in planning, monitoring, and evaluation
- flexibly apply knowledge across disciplines (through continued exploration of Science and Engineering Practices, Crosscutting Concepts, and Disciplinary Core Ideas)

Not included in this list are some other skills that students should master to succeed in today's college classroom and workplace.

First, students need to be able to

- work in diverse groups and with peers with different perspectives
- support their claims with logical arguments while being respectful and constructive in dealing with those who don't agree
- think critically and creatively
- communicate effectively in multiple settings and via diverse media

New Teaching Methods and a New Role for Teachers

The new focus on skills rather than content knowledge alone has led to big changes, backed by research, in how we teach science at universities and in K–12 classrooms. We know that active learning from student-centered activities that include group work and problem solving enhance student success.

There is no question that implementing NGSS requires teachers to shift both what and how they teach. For much of the instruction, the teacher’s role in the classroom is different. Because NGSS integrates the practices of science and engineering with content-area knowledge, there is an increasing focus on students being scientists in the discovery process and leading their own investigations. Does this mean teachers are less important? Not by a long shot. In fact, teachers are probably more important than ever! It will take a bit of work to adapt your course to active learning and to integrate NGSS-style learning, but believe me, it will be worth it for you and your students.

Some things to keep in mind:

- Think about questions. Asking the right questions can be critical to getting students on—or back to—the right track to discovering material for themselves and making connections between concepts that are critical to NGSS. Pose questions to get students to think deeply about the nature and strength of evidence used to support a claim.

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- Facilitate team learning. Science and engineering are all about teams, and students need to be comfortable working in groups with peers. Team learning can help students at very different levels benefit from the same course of investigation. I have found that strong students gain better mastery of concepts when they help students who are having trouble. On the flip side, some students actually learn better from a peer than a teacher! Pay attention to group dynamics, but facilitate cooperative teams wherever you can.
- Moderate discussions and peer critiques purposefully.
- Remember that NGSS can help improve math skills. Throughout *HMH Into Science*, you’ll find opportunities to practice age- and discipline-appropriate math practices to support science investigations and learning. Find ways to bring math into investigations. Math is critical to science and engineering, and science and engineering can make math more accessible and exciting to students!

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- Help students make connections continuously. The *HMH Into Science* Teacher Edition provides many strategies to assist students in making those connections. There is plenty of evidence that having multiple opportunities to associate pieces of information in different contexts facilitates retention. NGSS is built so that particular standards can be blended with others and integrated throughout a year and across grade levels. Online resources facilitate this blending—and you will find them already integrated in *HMH Into Science*!

- Collaborate! Whether you teach kindergarten or college, you are not alone in applying NGSS innovations in science education. When you talk to your colleagues and look online for best ideas and practices, you are serving as a role model for your students.

As you move into teaching NGSS and preparing students for college and career, look for the many strategies and opportunities for assessment embedded in both the student-facing materials and the Teacher materials of your *HMH Into Science* program. These will facilitate implementation of best practices in NGSS pedagogy. Even if your students won't be entering STEM fields, solid science education at this point will help students prepare for the coming years by inculcating the critical thinking skills necessary for science literacy and making informed, reasonable, evidence-backed decisions in all facets of life.



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