

# **Contemporary Science Instruction in Grades 6-12**

## What Is the Issue?

A fundamental shift in how we teach science and engineering is needed to prepare students for the future. Making science investigation and engineering design the central approach for teaching and learning science and engineering is a more effective and engaging way for students to learn. Centering these practices in the classroom can help students learn about key concepts, strengthen critical thinking skills, and ultimately develop a life-long interest in science. Instead of memorizing content and repeating common laboratory exercises, all students engage with phenomena and challenges and ask questions, gather and analyze information, develop explanations, and communicate what they have learned. This helps them to make sense of the world around them.

This type of instruction is far removed from a cookbook-type experiment that many of us experienced. Because students arrive at their findings by asking questions, investigating, gathering evidence, and revising their understandings, what they learn is more likely to stick with them. For example, please see [*Why don’t antibiotics work like they used to?*](https://www.nextgenstorylines.org/why-dont-antibiotics-work-like-they-used-to)

## Why It Matters to You

**Educators:** All students have the right to learn about science and engineering in ways that are consequential and compelling to them. There are many different ways that learner interests can be meaningfully taken into account during instruction—by creating experiences, by adapting curriculum, or by resourcing and positioning students (Bell, 2019).

**School Leaders:** Every student should have access to grade-appropriate assignments, strong instruction, deep engagement, and teachers with high expectations, every day, in every class—regardless of their race, ethnicity, or any other part of their identity (TNTP, 2018).

## Things to Consider

* We design learning experiences to ensure that all students have some appreciation of the beauty and wonder of science; possess sufficient knowledge of science and engineering toengage in public discussions on related issues; are careful consumers of scientific and technological information related to their everyday lives; are able to continue to learn about science outside school; and have the skills to enter careers of their choice, including (but not limited to) careers in science, engineering, and technology (NRC, 2012, p.1).
* The course frameworks for Advanced Placement science are consistent with the centering investigation and design in science curricula. The College Board encourages student development of inquiry and reasoning skills, such as designing a plan for collecting data, analyzing data, creating models and representations, applying mathematical routines, developing a scientific argument, and connecting concepts in and across domains (College Board, 2022).
* Contemporary science education shifted the goal of learning from “defining and understanding” science ideas to “developing and using” knowledge. (NRC, 2012, p.7-8).

## Key Features of Contemporary Science Instructional Materials

Contemporary science units and lessons:

* Are 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 NJSLS-S.
* Support three-dimensional teaching and learning for every student by placing the lesson in a sequence of learning for all three dimensions and providing support for teachers to engage all students.
* Support monitoring student progress in all three dimensions of the NJSLS-S as students make sense of phenomena and/or design solutions to problems.

## Diversity, Equity, and Inclusion

* Instructional strategies vary in terms of how they relate the science being learned to the lives and interests of the learners and the communities they are part of. Some instructional models—for example, culturally relevant instruction—actively connect to and build upon the life experiences and practices of learners.
* In order to make science teaching and learning as inclusive as possible, educators should select instructional models that engage students with the practices in different, locally relevant ways.

## Recommended Actions You Can Take

* Get into the habit of using the [NGSS Lesson Screener](https://www.nextgenscience.org/sites/default/files/NGSSScreeningTool-2.pdf) when first considering new instructional material. This is an informal review that helps educators to decide if the instructional materials are worthy of an analysis using the [EQuIP Rubric](https://www.nextgenscience.org/resources/equip-rubric-science).
* Become a critical consumer of instructional materials. Before using something, check third-party evaluations. [Ed Reports](https://www.edreports.org/reports/science), the [NextGenScience Peer Review Panel](https://www.nextgenscience.org/peer-review-panel/nextgenscience-peer-review-panel), and the published findings from state education agencies that support statewide instructional materials reviews such as [Oregon](https://www.oregon.gov/ode/educator-resources/teachingcontent/instructional-materials/pages/adopted-instructional-materials.aspx) and [Louisiana](https://www.louisianabelieves.com/resources/library/k-12-science-resources).

## Reflection Questions

* How satisfied are you with your current way of teaching science and engineering? How well does it engage students in the science and engineering practices?
* What instructional models do you currently use? Which additional ones might be suitable for your context?
* Think incrementally about shifting your teaching towards interest-driven science instruction. Which units are a strong starting place?

## Resources for Additional Professional Learning

* [Evaluating Curriculum Materials for Alignment with the New Vision for K-12 Science Education](https://stemteachingtools.org/assets/landscapes/STEM-Teaching-Tool-23-Analyzing-Curric-EQuIP.pdf)
* [Are there multiple instructional models that fit with the science and engineering practices in NGSS? (Short answer: Yes.](https://stemteachingtools.org/assets/landscapes/STEM-Teaching-Tool-4-Multiple-Instructional-Models.pdf))
* [Using curriculum adaptation as a strategy to help teachers learn about NGSS and developing aligned instructional materials](https://stemteachingtools.org/assets/landscapes/STEM-Teaching-Tool-5-Curriculum-Adaptation.pdf)

# **Bibliography**

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