## Innovation 5: All Standards, All Students

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| **Summary** | Science instructional materials support equitable access to science knowledge and practice for all students. |

The NGSS offer a vision of science teaching and learning that presents both opportunities and demands for **all** students. This is an innovation of the NGSS based on both how the standards were developed as well as the nature of the common minimum expectations for all students by the end of 12th grade. During the development of the NGSS, the research about how students from diverse backgrounds and experiences learn science was built into the very architecture and make-up of the standards rather than only being a part of a review—for example, the SEPs and CCCs provide multiple ways and access points for students to approach learning goals; and science is expected to build progressively from elementary school onward such that all students have the opportunity to develop scientific knowledge and practice. The standards pose the expectation that all students should have access to—and be well supported in learning—knowledge and practice across the range of DCIs, SEPs, and CCCs. This contrasts with science expectations that are only applicable to some students, and represents a significant shift to ensuring that all students are better prepared for their lives beyond high school.

Instructional materials that are designed for the NGSS provide opportunities for students and guidance to teachers for intentionally supporting diverse student groups, including students from economically disadvantaged backgrounds, students with special needs (e.g., visually impaired students, hearing impaired students), English language learners, students from diverse racial and ethnic backgrounds, students with alternative education needs, and talented and gifted students. They do so using a variety of strategies, but also ensure the following features of NGSS design are intentionally leveraged to support diverse learners.

### **Using relevant and authentic phenomena to create equitable learning contexts.**

The focus on engaging real-world phenomena and design problems addresses diversity and equity considerations when the phenomena and problems are relevant to students and offer opportunities for students to make meaningful connections to them based on their own experiences and questions as drivers of learning experiences. Instructional materials should support teachers in meeting the needs of diverse students and in identifying, drawing on, and connecting with the cultural and linguistic experiences their students bring to the science classroom (National Research Council 2014), as research suggests that students’ science learning will be most successful if classroom experiences draw on and connect with these experiences (Rosebery et al. 2010; Warren, Ballenger, et al. 2001). Materials should carefully choose and/or provide flexibility in the focus phenomena or problems for each course, unit, or lesson, considering the interest and prior experiences of diverse students. When phenomena may not be relevant or clear to some students (e.g., crop growth on farms might not be relevant to those who don’t live near farms), the materials should offer alternate phenomena or problems to the teacher, or alternative ways for the teacher to ensure all students have an authentic and meaningful access point to connect to the learning experience. Materials also need to provide opportunities for students to make meaningful connections to the learning context, including by consistently cultivating student questions that connect the phenomena and problems to their current understandings, interests, and backgrounds, and regularly using those questions to drive the next learning experience.

### **Using the three dimensions to support equity and access.**

Selecting relevant and authentic learning contexts to ground learning experiences in instructional materials is critical to supporting all students, but it is not sufficient. Students’ learning experiences that are connected to those phenomena also need to be designed such that making progress toward learning goals is accessible to all students. The three-dimensions and three-dimensional learning offer a path for students to negotiate their thinking and advance their understanding in accessible ways, when used intentionally to support diverse students. As an example, the NGSS offer opportunities for all students to engage in collaborative, rigorous science learning and rich language learning via the SEPs (Lee, Quinn, & Valdés, 2013; Quinn, Lee, & Valdés, 2012), and materials can highlight this by including additional supports, such as modifications for language learners, that do not compromise the science content; offering alternative approaches to engaging in practices (e.g., written, oral, diagrams); or offering ways to increase the sophistication with which students use the three-dimensions productively within a learning experience for students with high interest or advanced understanding. For more information regarding equitable learning opportunities and research-based effective classroom strategies for diverse student groups, see [Appendix D, “All Standards, All Students”](http://nextgenscience.org/sites/ngss/files/Appendix%20D%20Diversity%20and%20Equity%206-14-13.pdf) and the accompanying [Case Studies](http://www.nextgenscience.org/appendix-d-case-studies), which provide examples of strategies classroom teachers can use to ensure that the NGSS are accessible to all students.

### Ensuring equitable opportunities to demonstrate student thinking.

Students need to have adequate opportunities to demonstrate their understandings and abilities in a variety of ways and appropriate contexts. Instructional materials designed for the NGSS should include many kinds of assessment opportunities, including (1) many that don’t rely solely on English speaking or writing skills to effectively demonstrate science learning, and (2) opportunities for students to provide, receive, and act on feedback from a range of sources (self, peer, teacher) as well as formats (e.g., discourse; performance tasks; oral, written, graphical presentations). Materials should include support for appropriate modifications and accommodations, as well as support for interpreting and acting on assessment information in ways that promote equitable science learning.

For more examples of NGSS Innovation 5: All Standards, All Students, see Table 6.

Table : NGSS Innovation 5: All Standards, All Students

High quality instructional materials programs designed for the NGSS include:

| **Less** | **More…** |
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| Students focusing on finding ways to remember information without coordinated opportunities to connect the learning to their personal experiences inside and outside of school. | Students having substantial opportunities to express and negotiate their ideas, prior knowledge, and experiences in ways that are productively connected to the learning experiences. |
| Materials including separate lessons or activities for students with different language or abilities. | Instructional materials create learning experiences that students with diverse needs and abilities can connect to and use to make progress toward common learning goals through a variety of student approaches within the same learning sequence. |
| Use of flashy phenomena as an interesting hook with the assumption that all students will find that compelling. | Inclusion of phenomena and problems that are relevant and authentic to a range of student backgrounds and interests, with supports for modifying the context to meet local needs and opportunities for students to make meaningful connections to the context based on their current understanding and personal experiences. |
| Materials providing limited ways of meeting learning goals, such as reading about topics, listening to lectures and note-taking, and following written or oral labs. | Materials engaging the SEPs, CCCs, and DCIs as access points and diverse ways for students to learn (e.g., students using the practice of argumentation and evidence-based discourse to develop scientific understanding; students developing and using modeling to make sense of phenomena and problems as well as make thinking visible in ways that are less dependent on English language proficiency). |
| Focusing teacher materials on delivering information to students without providing support to help teachers value and build on the experiences and knowledge that students bring to the classroom | Teacher materials including suggestions for how to connect instruction to the students' home, neighborhood, community and/or culture as appropriate and providing opportunities for students to connect their explanation of a phenomenon and/or their design solution to a problem to questions from their own experience. |
| Teacher materials only offering minimal or non-context specific support for differentiation. | Teaching materials including:   * Appropriate reading, writing, listening, and/or speaking alternatives (e.g., translations, picture support, graphic organizers, etc.) for students who are English language learners, have special needs, or read well below the grade level. * Extra support (e.g., phenomena, representations, tasks) for students who are struggling to meet the targeted expectations. * Extensions for students with high interest or who have already met the performance expectations to develop deeper understanding of the practices, disciplinary core ideas, and crosscutting concepts. |