



## AERO NGSS

The Next Generation Science Standards (NGSS) were developed through a collaborative, state-led initiative to provide science standards that were rich in content and practice. These standards are organized across disciplines and grades to provide all students an internationally benchmarked science education.

Based on the National Research Council's (NRC) *Framework for K-12 Science Education*, the NGSS lays out the core ideas and practices in science that students should master in preparation for college and careers. They clarify for students the relevance of science, technology, engineering and mathematics (the four STEM fields) to everyday life. Like the Common Core Standards for mathematics, the NGSS are largely pedagogical standards; that is, their methodology engages students with the content using the practices of authentic Mathematics and scientific study. Just as the Common Core Mathematics standards describe what it means to be proficient in mathematics, NGSS describes what it means to be proficient in science.

A unique aspect of the NGSS is a three-fold system of student engagement: each standard has corresponding science and engineering practices, disciplinary core ideas, and crosscutting concepts. These provide guidance in terms of the expected vertical alignment, its relationship to other branches of science, and the conceptual significance to the overall nature of science. Unlike previous content standards, where topics were placed indiscriminately into various grade levels, the NGSS are thoughtful in scaffolding knowledge and fostering interdisciplinary studies in all areas of science and literacy.

Checking for alignment of the AERO's Framework for Science's and NGSS was a complex process. Alignment meant more than just "checking boxes" or a simple "crosswalk" from old standards to new. We needed to consider if the performance expectations showed a major overlap in terms of scope and substance and if they had comparable levels of cognitive demand. Some important points needed to be considered were: AERO showed the progressions of learning from K to 4 and 5 to 8 while NGSS is arranged by Disciplinary Core Ideas (DCI's) and by topics (performance expectations that are bundled to address a science topic) at each grade level K to 5. The NGSS grade 6-8 standards represent the combined content and skills to be mastered by the end of middle school. The standards were not assigned to particular grade levels. We chose to examine and compare the NGSS Standards and Progressions to the AERO Learning progressions (Performance indicators).

The content of AERO and NGSS are similar. However there is a major difference in the performance expectations. Currently, standards focus on knowledge. The vision of NGSS is that science education focuses on "knowledge in use." The changes for

science education required by NGSS are significant. In order to maximize their vision, teaching science must include interweaving of the 3 components: science and engineering practices, disciplinary core ideas, and cross-cutting concepts. Just like we do not teach the mathematical practices, we do not teach the science practices. They define the student's engagement with the content. For this reason, a transformation of current instructional practices is needed to reflect the NGSS vision.

As we have learned from implementation of AERO Common Core Plus, effective implementation means a top-to-bottom re-examination of what students should know and be able to do as well as how to deliver and engage students in the curriculum that is designed to teach the standards. **The standards (CC and NGSS) are not a curriculum.** Curriculum is the roadmap that teachers use to help students acquire and master the knowledge and skills detailed in the standards. A coherent and specific curriculum is *mapped backwards* from desired performances. The focus is on instruction and assessment.

It will take time to implement with fidelity the vision of NGSS. In the next 1-2 years, even NGSS is suggesting that states think strategically about how to best move forward their implementation efforts.