

Climbing Down: Executive Summary

In April 2013, the Next Generation Science Standards (NGSS) entered America's education system. The NGSS were created to guide science instruction in America's K-12 schools. The National Research Council (NRC), the National Science Teachers Association, the American Association for the Advancement of Science, and Achieve, Inc. drafted the NGSS to complement the Common Core State Standards for Mathematics and English Language Arts. By 2021, most states either adopted NGSS or incorporated material from the NRC's predecessor science curriculum framework. Unfortunately, the NGSS were neither vetted nor pilot tested. These organizations foisted inferior science standards upon the American public education system.

The NGSS standards contain numerous omissions. The physical science standards possess barely enough material for a one-year physical science course, the chemistry standards suffice for a one-semester chemistry, and the physics standards are grossly inadequate. The NGSS replace substantive coverage of earth and space science with ideologically charged material on climate change. The life science standards fail to mention fundamental concepts such as bacteria, viruses, and cell and tissue types.

The NGSS's most extraordinary omission is the scientific method itself. NGSS mentions the scientific method in its appendices, but in the main standards it speaks of the varying techniques in different disciplines rather than articulating the universally applicable characteristics of the scientific method. The absence of an explicit articulation of the scientific method means that students will never learn the theoretical foundations for proper research techniques that seek to produce verifiable and reproducible evidence. Students cannot learn scientific research's rational processes without learning the scientific method.

The NGSS's pedagogy further damage science instruction by replacing content standards (*what* students must learn) with process standards (*how* students must learn). The NGSS prescribes project-based learning and problem-based (inquiry-based) learning, constructivist methods of education that disregard the importance of knowledge scaffolding and individual acquisition of content knowledge. The NGSS moreover complicates science instruction by requiring one teacher to teach and integrate four domains (physical sciences, life sciences, engineering, and earth and space sciences) within a single class. Further flaws include overreliance on theoretical models rather than empirical evidence; emphasis on professional consensus rather than data and evidence; dependence on Science, Technology, and Society (STS), an interdisciplinary field that conflates scholarship with political activism; and an overt effort to conflate environmental activism with science instruction.

The NGSS too generally interleave science instruction with political indoctrination. The NGSS rely on an ideologically charged “sustainability” conceptual vocabulary to discuss climate science. The standards assume:

1. the existence of global warming, rather than methods to assess the evidence for and against global warming;
2. the primary salience of anthropogenic global warming; and
3. that humans’ effect on the earth is largely destructive.

The NGSS build upon these assumptions to align science education with environmental activism. Climate change may exist, and conservation (distinct from the radical environmentalism of “sustainability”) may be a virtue, but a science class should teach students the facts and methods necessary for a scientific judgment of these claims rather than endorse them *a priori*.

The NGSS manifests its most extraordinary commitment to political activism in its appendix devoted to the radical ideological agenda euphemized by the terms *diversity* and *equity*. Here the NGSS commit themselves to eliminating science achievement gaps across all identity groups by removing challenging science content. They reduce rigor so as to produce more “equitable” educational outcomes among students—a remarkable coercive expression of the soft bigotry of low expectations. In the name of equity, the NGSS leaves all students equally unprepared for STEM undergraduate majors or STEM careers.

Even the NGSS’s welcome innovations have been executed improperly. The NGSS’s introduction of engineering standards improves STEM education (Science, Technology, Engineering, and Mathematics) by sustained coverage of the ‘E’ in STEM. Unfortunately, NGSS’s alignment with the Common Core mathematics standard vitiates their engineering instruction. Since the Common Core standard delays advanced mathematics until the later grades, the NGSS standards teach engineering without proper mathematical foundations.

The NGSS impose deficient education standards that will leave students scientifically semi-literate. Parents, teachers, and district school boards should take steps to correct the deficiencies in the NGSS. These steps should include:

4. States should use the Fordham Institute’s A-graded science standards as a template. They might incorporate helpful innovations from the NGSS, such as the engineering standards, but only corrected to include adequate mathematics preparation.
5. States that have already adopted the NGSS should revise them with reference to the Fordham Institute’s A-graded science standards.
6. Chemistry and physics standards should be supplemented with previous existing standards to provide sufficient preparation for undergraduate STEM courses.
7. States should consider replacing CCSS mathematics with higher-level standards, such as the excellent and highly rated pre-CCSS California mathematics standards.
8. States which choose to incorporate engineering in K-12 science education should adopt rigorous standards that require substantial amounts of mathematics.
9. States should allow, encourage, or require students to begin algebra in 8th grade rather than 9th, so that they may be prepared for rigorous high-school science classes.

10. School districts using the NGSS should encourage science teachers to use pedagogies that emphasize knowledge retention rather than project learning.
11. States should ensure that science instruction focuses its case studies on the most important episodes in the history of science, without reference to the scientists' race or sex, although with preference for outstanding American scientists and engineers.
12. States should remove all political commitments from science education, especially those to *diversity*, environmentalism, and activism.
13. States should ensure that science standards steer students toward the full range of scientific careers, especially those that serve the American national interest.
14. States should ensure that science standards emphasize that devotion to science and engineering is its own reward, without reference to any "societal need," and that all research and design can and should aim above all for truth and beauty.