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# Governance Brief

## Supporting the California Next Generation Science Standards

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The California Next Generation Science Standards (CA NGSS) aim to ensure that all students have access to science and engineering instruction — education critical to preparing them for college, career, and life. CA NGSS instruction centers on understanding and applying scientific concepts. Therefore, effective implementation of the CA NGSS is critical to its success, and requires sufficient support and training for teachers, comprehensive district plans, and direction from governing boards.

The goal of this governance brief is to inform board members about the timeline and background for the implementation of the CA NGSS, and to provide recommendations on how governing boards can best support such efforts.

### In this brief:

- » Explanation of the need for the new science standards and their impact
- » Overview of the timeline and components for implementation of the science standards
- » Advice for boards on how they can support implementation of the science standards

### CA NGSS Background

Nearly one in five jobs in the United States requires at least some education in science, technology, engineering, and math (STEM), with the growth of these jobs expected to outpace growth in other sectors.<sup>1</sup> Furthermore, according to a 2015 report by the Public Policy Institute of California, the state faces a shortage of 1.1 million college-educated workers by 2030. Demand is expected to increase most

rapidly in many high-paying STEM-focused occupations, including computer and mathematical science, architecture, engineering, and health care.<sup>2</sup> The ability to meet this demand with an educated, prepared workforce — particularly in science and engineering — is crucial to California's future economic prosperity.

The CA NGSS are designed to provide this education for K-12 public school students. The new standards are based on robust research and the contributions of teachers, scientists, and education experts to ensure relevance and real-world applicability. The CA NGSS also provides teachers with the flexibility to design learning experiences that are relevant to their students and the local community.

### *The Need for New Science Standards*

It has been nearly 20 years since the 1998 adoption of California's previous science standards. Since then, there have been transformational scientific and technological advancements that highlight the need for new standards that emphasize the skills and knowledge required to keep pace with these breakthroughs. In addition, the CA NGSS provides students with a solid foundation in science and important life skills, including critical thinking, collaboration, and problem solving.

### *Implementation Timeline and Key Components*

The State Board of Education (SBE) adopted the CA NGSS in fall 2013. To assist effective implementation and support for teachers, the SBE approved the *NGSS Systems Implementation Plan for California* in November 2013. The plan's timeline provides for a gradual transition, with full implementation in every classroom slated for the 2018-19 school year. The California Department of Education (CDE)

will provide guidance throughout the transition. School and county board members can also support this transition by ensuring that their school district or county office of education has a plan for each step in the process. The timeline includes the following key components:

- » **Adoption of the California Science Curriculum Framework.** The SBE approved the new California Science Curriculum Framework in November 2016. Since 2014, the development of the framework has comprised multiple focus groups and public comment periods, including the participation of CSBA.
- » **Adoption of Instructional Materials.** Following the adoption of the framework, new science instructional materials will be adopted. The list of K-8 science instructional materials is expected to be approved by the SBE in 2018. For 9-12<sup>th</sup> grade, county offices of education and school districts will be responsible for identifying instructional materials that are aligned to the content standards and that meet the needs of all students.
- » **Science Assessments.** The California Assessment of Student Performance and Progress (CASSPP) plan includes science assessments in 5<sup>th</sup> and 8<sup>th</sup> grade, and once in high school. During the 2014-15 and 2015-16 school years, the first two years of CASSPP implementation, students took the California Standards Test (CST), the California Modified Assessment (CMA), or the California Alternate Performance Assessment (CAPA) in science. The CMA and CAPA are alternate, individually administered science assessments for students with disabilities. In 2016, the SBE adopted a plan for establishing NGSS-aligned student assessments, the California Science Test (CAST) and the California Alternate Assessment for Science (CAAS), which will eventually be included in the state’s accountability system. Once fully implemented, the CAST and CAAS will be administered in 5<sup>th</sup> and 8<sup>th</sup> grade, and once in 10-12<sup>th</sup> grade (the grade at which the assessment will be administered at the high school level will be a local decision). The timeline for these assessments is as follows:

Year	California Science Test (CAST)	California Alternate Assessment for Science (CAAS)
Spring 2017	Pilot Test	Pilot Test
Spring 2018	Field Test	Pilot Test
Spring 2019	Full Implementation	Field Test
Spring 2020	Full Implementation	Full Implementation

Beginning in the 2016-17 school year, all 5<sup>th</sup> and 8<sup>th</sup> grade students will participate in the CAST or CAAS pilot, with the CDE assigning (by January 2017) a grade to be assessed for each high school. The pilot test for the CAAS will be administered for two years to ensure a more accurate measure for students with significant cognitive disabilities. It is also worth noting that while there is an optional standards-based test in Spanish for English language arts, there is no plan to offer such a test for math or science.

- » **Professional Development.** In preparation for the full rollout during the 2018-19 school year, county offices of education and school districts should immediately start to educate teachers and administrators about the new standards and their effective implementation. In addition to the training provided by county offices of education, school districts, and schools, the CDE and other groups, including CSBA, are also offering training for school district leaders on CA NGSS implementation.

### The CA K-8 NGSS Early Implementation Initiative

Eight California school districts and two charter management organizations (CMOs) are currently implementing the CA NGSS through a four-year demonstration project. By fully implementing the new standards ahead of other school districts, these early implementers can serve as a source of best practices and lessons learned. The initiative is also helping teachers and administrators develop the skills needed for the rollout of CA NGSS. Participating districts include Galt Joint Union Elementary School District, Kings Canyon Unified School District, Lakeside Union School District, Oakland Unified School District, Palm Springs Unified School District, San Diego Unified School District, Tracy Unified School District, and Vista Unified School District. The project is funded by the S.D. Bechtel, Jr. Foundation, led by WestEd’s K-12 Alliance, and supported by the CDE and Achieve. The CMOs in the initiative are Aspire and High Tech High, with their participation funded by the Hastings/Quillin fund at the Silicon Valley Community Foundation.

Teachers participating in this initiative contribute monthly to *California Classroom Science* (<http://bit.ly/2eyRV4x>) and more information can be found at the K-12 Alliance website (<http://bit.ly/2ep6Hgd>).

## Impact of CA NGSS Implementation

Among the many benefits of the CA NGSS, their full implementation will:

- » **Increase Student Engagement.** The CA NGSS are designed to encourage curiosity, inspire students to ask questions about the world around them, and allow for hands-on learning — all while incorporating the most current ideas and discoveries.
- » **Provide Science and Engineering Instruction in the Early Grades.** The CA NGSS promotes a curriculum focused on building scientific concepts over time, from Kindergarten through high school. Teaching science across all grades — and in the early grades in particular — is a critical change from the previous standards. According to a 2011 report, 40% of elementary teachers stated that their students received 60 minutes or less of science instruction per week, while 13% reported 30 minutes or less.<sup>3</sup> This is not ideal, particularly because research shows that early exposure to STEM material is essential for encouraging more females and students of color to pursue STEM careers. In addition, early exposure to science and related concepts has been shown to develop critical thinking and reasoning skills and support academic achievement in other subjects.<sup>4</sup>
- » **Promote Integration of Science Across All Subjects.** The CA NGSS encourages a collaborative approach to learning that incorporates science concepts within math and other subjects. Therefore, implementation of the standards requires additional support, time, and professional development for teachers in all grades and subject areas. For example, elementary teachers will need additional opportunities to learn science concepts while secondary teachers will need support and planning time to collaborate with their colleagues across subject areas. The long-term goal is for teachers to improve their instructional skills in science principles and across the curriculum.
- » **Encourage Real-World Learning Opportunities.** School district or county office of education collaboration with museums, libraries, businesses, community colleges, and universities can greatly supplement instruction and provide real-world experiences for students. For example, partnerships with business and museums can offer internships and summer jobs. County office of education or school district programs, such as afterschool programs, can also provide valuable experiences to underserved communities and students, which have been shown to help close opportunity

gaps. For example, the Afterschool Alliance found in a recent evaluation of STEM programs across the country that youth who attended high quality afterschool programs in middle school improved their attitudes about STEM fields and careers, increased their knowledge and skills, and were more likely to graduate and pursue a STEM career.<sup>5</sup>

## What Can Boards Do?

Implementing the CA NGSS takes planning, persistence, and time. Board members can make a critical contribution by establishing the right messages, ensuring that there is a coherent implementation plan, and allocating sufficient resources. Here are a few recommendations for how governing boards can support the transition to the CA NGSS:

### *Ensure an Implementation Plan Is in Place*

All school districts and county offices of education should have an implementation plan for the transition to the CA NGSS, including robust professional development for school leaders and teachers on the new instructional methods and assessments. While the roles of school districts and county offices of education are different, support should be a key theme. For a school district, providing support to school sites will be critical, while county offices of education will want to ensure that their school districts have sufficient guidance. Staff and resource capacity is always a concern but can be more challenging for small and rural school districts. In these situations, county offices of education can help fill gaps in services while also encouraging partnerships to bring about more resources. School districts and county offices of education can refer to the *NGSS Systems Implementation Plan for California* at <http://bit.ly/1qGigK1>

### *Align Resources*

With California's shift to greater local control of education, county offices of education and school districts have the authority and responsibility to set priorities and allocate resources to support any new endeavor. State law requires that all school districts and county offices of education include the implementation of the CA NGSS as a priority within their Local Control Accountability Plan. This process also allows board members to engage with teachers, school leaders, parents/guardians, and other stakeholders to ensure that the transition is widely supported. Investments in the transition should also emphasize closing opportunity gaps and ensuring that additional support is provided to schools with inadequate science offerings, teacher capacity, or science achievement. Local Control Funding Formula base funding can be used to support science implementation

while the use of supplemental or concentration funding may be appropriate for providing extra science support for high-need students. In addition, April 2016 guidance from the U.S. Department of Education provides recommendations for county offices of education, school districts, and schools to use federal funding to support STEM education, available at <http://bit.ly/1V24apj>

### *Prioritize Professional Learning*

High-quality instruction and qualified and well-trained staff are the most critical components of an effective transition to the CA NGSS. As demonstrated by the transition to California's new math and English language arts standards, school districts and county offices of education should prioritize investments in professional development for teachers and school leaders. Research has shown that effective teacher professional development occurs when aligned with the specific needs of schools and students, along with sufficient time to collaborate and apply concepts to curriculum planning.<sup>6</sup> Empowering experienced teachers to become leaders and train their peers can also be an effective strategy for delivering professional development while creating leadership and career growth opportunities. Fortunately, school districts and county offices of education do not have to think about this on their own. The California Science Teachers Association, the K-12 Alliance at WestEd, the California Science Project, CDE, and other groups, have offered and will continue to offer professional learning opportunities for teachers, administrators, and other school leaders.

### *Including the Community, Teachers, and Parents and Guardians*

Inclusion of the community, from teachers to parents/guardians in all aspects of the CA NGSS transition is also key to successful implementation. Therefore, it is important for county office of education and school district leaders to communicate the goals of CA NGSS and its potential for positive impact on student success. Parents/guardians can in turn, be key contributors to STEM education at home, in the classroom, and through their feedback on school and district plans. The California PTA has resources available for county offices of education and school districts that can support parent/guardian engagement efforts, available at <http://bit.ly/2dDNWUE>

## Questions for Board Members

As important decision makers in their school districts and county offices of education, board members have a responsibility to ask questions and think strategically about the implementation of the CA NGSS and the support it will require. Answers to the following questions can help board members prepare for and support the CA NGSS implementation:

1. Has our school district or county office of education developed a plan for the implementation of the CA NGSS? Have funds been allocated to support all phases and aspects of implementation, including for the purchase of materials and professional development?
2. What does our current science and engineering instruction look like? What does it look like for student groups? Based on their achievement, are there schools or student populations that might require additional support during and after implementation?
3. Have we analyzed facility and equipment needs and is there a plan to address them? Do our facilities have sufficient laboratory space?
4. What are the professional development opportunities provided to teachers about CA NGSS implementation? Is there support for teachers targeted specifically at the elementary and secondary levels?
5. Does each school have teachers with the appropriate credentials, training, and support to deliver strong science and engineering instruction? Is there a plan to compensate for gaps in staffing capacity in a time of teacher shortages? Is there a plan for professional development to advance learning and leadership skills?
6. What are the best methods to communicate the changes in science and engineering instruction and assessment to staff, students, parents and guardians, and the greater community? Are potential anxieties or concerns anticipated and addressed in a communication plan? How can we engage stakeholders in ways that stimulate their support?
7. Have we reached out to local partners, such as museums, businesses, community colleges, and universities to support science and engineering instruction and develop additional resources and learning opportunities for students?

In addition, the following questions are specific to county offices of education as they build their capacity to support school districts and schools under California's new accountability framework:

8. Has the county office of education contacted school districts to determine initial needs and supported them in the development of an implementation plan?
9. How can the county office of education help school districts share resources, plans, and best practices?
10. For county offices of education serving small or rural school districts, what are the capacity gaps in each school district? How can the county office of education build its capacity to help meet these gaps?

## Conclusion

The CA NGSS is a key educational foundation for all California students, and critical to preparing them for college and the workforce. School district and county office of education board members can help with implementation by supporting CA NGSS as a top priority, and by ensuring the requisite teachers and staff are in place. In addition, all school district and county office of education plans should include provisions for monitoring opportunity gaps and ensuring that there are aggressive strategies to close them. The CA NGSS play an important role too in closing these achievement gaps through their focus on student engagement and learning across disciplines and subject areas. CSBA will continue to monitor CA NGSS implementation and other issues in California's changing education landscape and alert governance teams to opportunities to improve achievement for all California students.

## Resources

### *CSBA Resources*

CSBA will continue to issue guidance to board members on the implementation of new standards and assessments. Subscribers to CSBA's policy services have access to AR 6162.51 – State Academic Achievement Tests through Gamut Online at <http://www.gamutonline.net/>

### *External Resources*

- » **The California Alliance for Next Generation Science Standards (CA4NGSS) Communications Toolkit.** The CA4NGSS facilitates collaboration among education, business, government, and community leaders to support effective and timely implementation of NGSS throughout California. As a member, CSBA is supporting the development of communication toolkits for multiple stakeholders. Completed materials can be found at <http://bit.ly/2eM5OtZ>
- » **California Department of Education (CDE).** The CDE provides relevant information on the implementation of the CA NGSS, including guidance for county offices of education, school districts, and schools. Visit CDE's NGSS page at <http://bit.ly/1GzhQxB>
- » **NGSS Systems Implementation Plan for California.** California's implementation plan for the transition to the new science standards, available at <http://bit.ly/23oPcyu>
- » **U.S. Department of Education Dear Colleague Letter.** Letter providing guidance on how to use federal funding to support STEM education, available at <http://bit.ly/1V24apj>
- » **Science Collaboration Committee.** A multi-stakeholder leadership group focused on strengthening and building state systems of support to help teachers and schools implement the CA NGSS instructional shifts. To learn more, visit <http://bit.ly/2eD4H0Y>
- » **California PTA Resources for Engaging Parents in STEM Education.** Resources for county offices of education and school districts that can support efforts at parent engagement, available at <http://bit.ly/2eySmvG>
- » **Teaching Channel Video: NGSS: A Vision for K-12 Science Education.** Available at <http://bit.ly/1wywN2C>

## Endnotes

- 1 Rothwell, J. (2013). The hidden STEM economy. Metropolitan Policy Program at Brookings. Retrieved from <http://brook.gs/2e4PumZ>
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- 3 Dorph, R., Shields, P., Tiffany-Morales, J., Hartry, A., McCaffrey, T. (2011). High hopes — few opportunities: the status of elementary science education in California. The Center for the Future of Teaching and Learning at WestEd. Retrieved from <http://bit.ly/2eCQUHx>
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- 5 Afterschool Alliance. (2011). STEM learning in afterschool: an analysis of impact and outcomes. Retrieved from <http://bit.ly/1IRgPmo>
- 6 Darling-Hammond, L., Chung Wei, R., Andree, A., Richardson, N., Orphanos, S. (2009). Professional learning in the learning profession: a status report on teacher development in the United States and abroad. National Staff Development Council. Retrieved from <http://bit.ly/2eERdRr>

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