

Guide to District Action Next Generation Science Standards

Unpacking the Next Generation Science Standards

Science is central to how we understand and make sense of the world around us. In the past few years, to help improve science instruction for all students, many states across the country have adopted new standards called the Next Generation Science Standards (NGSS), which are based on research regarding how students best learn science. These new standards require science to be taught as a core subject in grade K-12. More importantly, **the new standards shift the focus away from memorizing facts to gaining deeper conceptual understanding of core concepts and to doing science and engineering through hands-on investigation and discovery.** They are part of a broader shift in education to help students build critical skills and competencies—such as problem solving, collaboration, investigation—that are essential to success throughout their lives.

District Leadership is Essential for NGSS Implementation

For most educators, it will take some time to become fully adept in the new instructional approaches. Teachers will need access to new and ongoing professional learning to help them make the shift in their classrooms, and school administrators will need training and support to align practices and policies to support strong science instruction. Thus, **it is essential that districts and schools work together to craft a coherent plan for implementation** of the NGSS.

While state standards are important, it is local school districts that have the power and responsibility to allocate the resources needed to support transition to the NGSS. District and community leaders need to take responsibility to ensure that a strong science education doesn't depend on where a child lives nor rely only on the enthusiasm of a few dedicated teachers. **School districts must establish plans to ensure that every school has the teachers, instructional resources, professional learning and other supports necessary** to offer comprehensive science education, based on the NGSS, to all students.

Introducing the Guide to District Action for NGSS

The Guide to District Action for NGSS provides district and community leaders with a recommended process and tools to develop an effective district wide implementation plan. The guide consists of two tools: The **NGSS Implementation Planning Tool (IPT)** and the **District Action Plan Template**. These are designed to work together to facilitate district planning across six key areas:

1. Implementation planning and systemic support
2. Financial and material resources
3. Professional learning plan
4. Student experience and classroom culture
5. Partnerships with family, community, and other stakeholders
6. Data and assessments

The Science Partnership

This educator brief is one of a series published by the Science Partnership, an 8-year project to develop, implement, and study a comprehensive K-12 professional development model for science education. The Science Partnership is a collaborative led by the [California State University East Bay](http://www.calstate.edu/eastbay) and the Alameda County Office of Education, with partners including the California Science Project, school districts and teacher leaders. Its work supports science teachers in shifting their instructional practices by developing teacher knowledge, teacher leadership and organizational capacity. The Science Partnership focuses on schools that serve predominately low-income, underrepresented students in the East Bay region of the San Francisco Bay Area. The Guide to District Action for NGSS was developed by Dawn O'Connor, Kathryn Hayes, Christine Lee Bae, Sara Dozier, and Phil Lafontaine.

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How to Use the Guide to District Action for NGSS

Ideally, the **Guide to District Action for NGSS** is meant to be used within the context of a multi-year district planning process. The IPT is organized into three major phases of NGSS implementation: Awareness, Implementation and Transition. For each of the six key areas, the IPT outlines key strategies to undertake in each phase. While the strategies could be translated directly into an action plan, it is more important that **they serve as a starting point for discussion among district and community leaders in order to create a plan that is responsive to specific local needs.** To carry out this planning process, we recommend that districts establish a team comprised of administrators, principals, and science teacher leaders. The team should be linked to the district’s annual planning process and should seek out feedback from students, parents, teachers and community leaders. **Successful planning is an iterative process that requires ideas and strategies to be developed, reviewed, revised and then mapped out in sufficient detail to be operationalized. Once the IPT has been used to set priority objectives, the District Action Plan Template can be used to identify the action steps, resources and timelines to carry out the plan.**

Six Characteristics of an Effective NGSS Planning Process

Based on testing with 11 districts over two years, the following approaches are recommended when using the tool:

- Designate a facilitator who is knowledgeable about both the NGSS and district processes.
- By involving district and site administrators, teachers, and community members, action plans will have strong stakeholder buy-in and coherence with other initiatives.
- Focus on one readiness phase at one time so as not to overwhelm stakeholders. This can be done in smaller committees, depending on the organization of the district.
- Start by grounding the conversation in the current state of the district, and then move forward on decisions for the future.
- Begin with areas of the district that are more advanced, then scale out from there. For example, one grade band may be more established in terms of leadership teams, progressions, and professional development, so it makes sense to start with planning for that grade band before tackling the other grades.
- Integrate objectives with the overall vision of the district and align NGSS implementation with other district initiatives as much as possible.

The Guide to District Action Design Process

The Guide emerged out of Science Partnership efforts to meet the needs of partner districts in terms of systemic capacity building for science education. The initial draft was developed out of collaborative work between the Science Partnership (Dawn O’Connor) and CDE’s Professional Learning for California (Phil Lafontaine) and based on the California State NGSS Implementation Plan. Subsequently, the guide went through iterative revision based on reception by the districts and review by statewide stakeholders involved in the NGSS rollout. In response to recommendations—particularly the need for detailed procedures—we drew on other state implementation plans to add more specific actions and alignment of actions over the years. Over the revision process, the Science Partnership researcher (Kathryn Hayes) examined the guide and tools to ensure inclusion of resources and processes shown in the research literature to be pivotal to supporting science education reform (e.g., Hatch, 2013; Hayes, et al. in review; Spillane, et al. 2001).



	Awareness Phase Possible Activities	Transition Phase Possible Activities	Implementation Phase Possible Activities
Implementation Planning and Systemic Support	<p><u>Vision and Implementation Team</u></p> <ul style="list-style-type: none"> • Create a NGSS leadership team with representation by diverse stakeholders (i.e., teachers, union reps, site and district administrators, board members and community) • Create a shared vision of science for all students based on the district’s core values, that attends to: <ul style="list-style-type: none"> • Supports for participation in science by underrepresented minorities • Teacher learning • District and school organizational capacity • Share the vision with all stakeholders; begin steps to attain approval (e.g., curriculum council presentation) <p><u>Implementation Plan</u></p> <ul style="list-style-type: none"> • Review the NRC Guide to Implementing the NGSS and CDE NGSS Systems Implementation Plan for California • Draft an initial NGSS implementation plan and timeline based on the vision • Communicate plan and timeline with all stakeholders • Identify components of districts culture that promotes innovation in NGSS • Review LCAP for language and funding that supports the implementation of NGSS <p><u>Vertical and horizontal articulation</u></p> <ul style="list-style-type: none"> • Review district’s high school science requirement, instructional minutes in elementary grades, and access to science courses for all students • Begin discussion related to integrated/discipline specific MS plan • Consider class and block schedules that support NGSS style science learning 	<p><u>Vision and Implementation Team</u></p> <ul style="list-style-type: none"> • Vision is articulated and endorsed by stakeholders; foster awareness and championship by board member(s) • Continue to develop leadership team <p><u>Implementation Plan adjustments</u></p> <ul style="list-style-type: none"> • Review challenges and identify strategies to: <ul style="list-style-type: none"> • Promote instructional innovation and shifts • Build capacity where needed • Adjust plan and timeline • Adopt requirements of science education time • Present NGSS implementation plan to board of education for adoption • Continue to communicate plan and timeline with all stakeholders • NGSS leadership team provides feedback on district’s LCAP Plan <p><u>Articulation with state and district policy</u></p> <ul style="list-style-type: none"> • Stay current on national, state and local info • Participate in public review of <i>California Science Framework</i> • Align implementation with other policies (CCSS) and initiatives • Review the University of California (UC) requirements for science <p><u>Vertical and horizontal articulation</u></p> <ul style="list-style-type: none"> • Make official decision regarding integrated or discipline specific MS model • Ensure elementary instructional minutes • Engage in discussion related to the high school course sequence. 	<p><u>Implementation Plan adjustments</u></p> <ul style="list-style-type: none"> • Evaluate and modify implementation plan as needed • Identify and promote innovative tools and practices that support NGSS implementation • Identify teachers that promote effective NGSS implementation and use as exemplars • Continue to communicate plan and timeline • Provide feedback on districts LCAP Plan • Identify plan for involving stakeholders and research in future curriculum adoption • Evaluate how to support 3-dimensional teaching practice <p><u>Articulation with state and district policy</u></p> <ul style="list-style-type: none"> • Review the finalized <i>California Science Framework</i> • Continue aligning initiatives across the district, including CCSS • Review with students the UC requirements for science <p><u>Vertical and horizontal articulation</u></p> <ul style="list-style-type: none"> • Identify plan for elementary science education time • Design Scope and Sequence AFTER Teachers experience the implementation of 3-dimensional units of instruction

	Awareness Phase Possible Activities	Transition Phase Possible Activities	Implementation Phase Possible Activities
Financial and Material Resources	<p><u>Identifying resource priorities</u></p> <ul style="list-style-type: none"> • Generate a priority list of funding needs for each phase of implementation • Inventory science instructional materials (e.g., lab equipment, technology) • Identify additional resources and personnel needed to support the resources <p><u>Identifying resources</u></p> <ul style="list-style-type: none"> • Determine district’s expertise: <ul style="list-style-type: none"> • District literacy, math, and science experts • Teacher content and pedagogy experts • Principal NGSS expertise • Identify local resources (e.g. business, service groups, and universities) to support NGSS implementation and to improve science in the district • Examine local resources for shared vision of teaching and learning 	<p><u>Identifying resource priorities</u></p> <ul style="list-style-type: none"> • Review and update list of funding needs for each phase of NGSS Implementation; integrate these into LCAP (or other sources) • Update inventory of science instructional materials and make recommendations with timeline • Codify additional personnel time needed to track, order, and care for science resources <p><u>Developing internal resources</u></p> <ul style="list-style-type: none"> • Identify district and school personnel responsibilities for implementation • Evaluate district expertise to support NGSS: District subject-area experts, teacher leaders, and interested principals; determine needed additional expertise • Specify time for planning and facilitating transition for teachers and leaders <p><u>Developing external resources</u></p> <ul style="list-style-type: none"> • Identify district personnel that will serve as liaisons for partnerships outside of the district • Evaluate local expertise and partnerships for shared vision of teaching and learning • Draft Fund-raising plan 	<p><u>Identifying resource priorities</u></p> <ul style="list-style-type: none"> • Review and update list of funding needs for NGSS implementation; integrate into LCAP <p><u>Developing internal resources</u></p> <ul style="list-style-type: none"> • Create ongoing inventory replacement plan, with identified personnel in charge • Specify leadership roles in NGSS implementation for teachers, principals and district personnel with the needed expertise • Specify time for planning and facilitating implementation for teachers and leaders <p><u>Developing external resources</u></p> <ul style="list-style-type: none"> • Prioritize partnerships in development stages • Seek additional partnerships and grants outside the community (i.e. corporate giving or federal grants).

	Awareness Phase Possible Activities	Transition Phase Possible Activities	Implementation Phase Possible Activities
Professional Learning (PL) Plan	<p><u>Professional learning structures</u></p> <ul style="list-style-type: none"> Assess current district understanding of NGSS, regarding: <ul style="list-style-type: none"> Organizational structure Innovative shifts Vision Supporting Documents Align schedules to support science specific PL time (across sites and grades if necessary to support collaboration and articulation) Determine the resources that are available in your district to assist with PL: <ul style="list-style-type: none"> Teacher Leaders TOSA/TSA Literacy Expertise External Partners: e.g., COE's, University Substitute teachers Craft teacher observation tools that support pedagogical risk-taking <p><u>Professional learning focus</u></p> <ul style="list-style-type: none"> Craft a PL model for gradually bringing teachers and administrators into the philosophy and practices of NGSS, with PL activities most likely to support deep and sustainable shifts in practice (like lesson study) Provide PL for administrators to support their understanding of what an NGSS Classroom looks like 	<p><u>Professional learning structures</u></p> <ul style="list-style-type: none"> Establish professional learning time for all teachers of science: <ul style="list-style-type: none"> Small teacher learning communities Articulation across schools Articulation across grade bands Intensive content and pedagogy learning Re-visit schedule alignment and academic calendar in support of necessary PL time Establish personnel who will spearhead, facilitate and monitor NGSS PD <p><u>Professional learning focus</u></p> <ul style="list-style-type: none"> Teacher PL focuses on: <ul style="list-style-type: none"> Deepening teachers' capacity to engage their students in the Science and Engineering Practices Collaborative unit design based on NGSS Reflecting on student understanding and use of practices Needed content knowledge Science discourse and classroom culture Provide PD for administrators regarding what a NGSS classroom looks like as students and teachers explore new strategies and processes aligned to NGSS 	<p><u>Professional learning structures</u></p> <ul style="list-style-type: none"> Dedicate site level PL time to planning for and reflecting on student understanding and use of practices Provide opportunities each year for vertical articulation between and within grade bands Consider specific needs at the elementary level <p><u>Professional learning focus</u></p> <ul style="list-style-type: none"> PL for all teachers of science focuses on: <ul style="list-style-type: none"> Understanding, designing, and evaluating 3 dimensional learning Creating assessments focused on evaluating student understanding and improving instruction Vertical articulation between and within all grade bands Continue to collaboratively develop, pilot, reflect, and revise NGSS -aligned units.

	Awareness Phase Possible Activities	Transition Phase Possible Activities	Implementation Phase Possible Activities
Student Experience and Classroom Culture	<p><u>Student experience NGSS shifts</u></p> <ul style="list-style-type: none"> Communicate with students: <ul style="list-style-type: none"> The NGSS vision for science learning The shifts that NGSS will require of students (e.g., active learning and assessment) New requirements for grading student work during inquiry Overlap and difference between CCSS and NGSS The timeline for classroom change and assessment Help students understand how the SEPs allow them to engage in science like the scientific community <p><u>Classroom, school, and district culture</u></p> <ul style="list-style-type: none"> Promote classroom cultures that support: <ul style="list-style-type: none"> Students asking questions All students engaging in verbal sense making and academic discourse (including girls and minorities) Students engaging in the SEPs Create a district culture and expectation that science is for all students, including consideration of existing inequities in instructional time, pedagogies, and resources. 	<p><u>Students experience NGSS shifts</u></p> <ul style="list-style-type: none"> Develop student understanding that the new standards will require engaging in the cycle of inquiry, with related changes in assessment and grading Students engage in pilot lessons that incorporate various aspects of NGSS (SEPs, DCIs, CCCs) and are relevant and appropriate to students' current context <p><u>Classroom, school, and district culture</u></p> <ul style="list-style-type: none"> Promote classroom cultures that support: <ul style="list-style-type: none"> Relationships that support intellectual risk taking All students engaging in verbal sense making and academic discourse (including girls and minorities) Students engaging in the SEPs Moving beyond "right and wrong" Create a district culture and communicate the expectation that science is for all students Address existing inequities in instructional time, pedagogies, and resources. 	<p><u>Students experience NGSS shifts</u></p> <ul style="list-style-type: none"> Students: <ul style="list-style-type: none"> Are immersed in a 3-dimensional learning environment Have enough time to engage in inquiry activities and assessments Reflect on their understanding of science ideas and their own learning Engage in student-centered learning <p><u>Classroom, school, and district culture</u></p> <ul style="list-style-type: none"> Reinforce site/district culture that supports intellectual risk taking Reinforce the district culture that science is for all students Create supports for historically marginalized students Continue to develop strategies, structures, and expectations for academic discourse in classrooms

	Awareness Phase Possible Activities	Transition Phase Possible Activities	Implementation Phase Possible Activities
Partnerships with Family, Community, and Other Stakeholders	<p><u>Messaging and communication</u></p> <ul style="list-style-type: none"> Identify community stakeholders Identify messages and communication strategies for each audience regarding: <ul style="list-style-type: none"> District’s science vision, implementation plan and timeline Recent changes in accountability mechanisms and LCAP NGSS science vision, and the increased cognitive demand Shifts in types of assignments/grading Funding and other needs Equity in science education <p><u>Building partnerships</u></p> <ul style="list-style-type: none"> Solicit community ideas and opinions regarding: <ul style="list-style-type: none"> The implementation plan How to meet the needs of their children in the context of NGSS Available community resources/expertise Create family/community science nights or other events that model the shift from factual recall to understanding phenomena Seek partnerships within the community that can support NGSS implementation 	<p><u>Messaging and communication</u></p> <ul style="list-style-type: none"> Evaluate effectiveness of communication/ messages Identify new avenues of communication/ messages Specify person or team in charge of communication Communicate the district’s progress with the implementation of NGSS As information about the statewide science assessments becomes available, communicate with stakeholders about the shifts in assessment and the instructional shifts needed to meet these demands <p><u>Building partnerships</u></p> <ul style="list-style-type: none"> Develop existing and additional partnerships within the community focused on: <ul style="list-style-type: none"> Garnering input regarding NGSS implementation Supporting identified needs Formatting LCAP to address NGSS Seek partners for family/ community science nights that create an understanding of careers supported by science education 	<p><u>Messaging and communication</u></p> <ul style="list-style-type: none"> Communicate the district’s progress with the implementation of NGSS Evaluate effectiveness of communication/ messages Prepare communication and events that demonstrate the shifts in assessment that the NGSS require <p><u>Building partnerships</u></p> <ul style="list-style-type: none"> Develop existing and additional partnerships within the community focused on understanding community strengths, needs, and resources in terms of science Strengthen partnerships for family/community science nights

	Awareness Phase Possible Activities	Transition Phase Possible Activities	Implementation Phase Possible Activities
Data & Assessment	<p><u>External Articulation</u></p> <ul style="list-style-type: none"> Review the NRC document Developing Assessments for the NGSS Monitor assessment information from the CDE <p><u>Evaluate District Approach</u></p> <ul style="list-style-type: none"> Build awareness that assessment tasks should be embedded in instruction Evaluate current district assessment strategies for best practice (e.g., benchmarks, formative assessment practices, projects) <p><u>Professional Learning</u></p> <ul style="list-style-type: none"> Provide PL regarding: <ul style="list-style-type: none"> How to <i>assess student understanding</i> in addition to evaluating student knowledge How to use observation and video to observe student sense-making How to design units and lessons with the learning outcomes in mind Provide collaboration time to discuss assessment strategies, challenges and successes Develop capacity among science leaders to create and evaluate assessment tasks <p><u>Communication</u></p> <ul style="list-style-type: none"> Communicate with community that students' demonstration of science knowledge is shifting away from multiple choice and fact-based learning and toward 3 dimensional assessment 	<p><u>External Articulation</u></p> <ul style="list-style-type: none"> Review the Performance Expectations and evidence statements Monitor assessment information from the CDE <p><u>Evaluate District Approach</u></p> <ul style="list-style-type: none"> Delineate formative, summative and benchmark assessments <p><u>Professional Learning</u></p> <ul style="list-style-type: none"> Provide collaboration time to determine student assessments for NGSS In collaborative groups begin to design assessments that measure student sense-making Pilot new instruction-embedded assessments that demonstrate 3-dimensional learning Work with teachers on how to evaluate student results from new assessments, and to shift instruction <p><u>Communication</u></p> <ul style="list-style-type: none"> Communicate with parents and stakeholders about new classroom assessments 	<p><u>External Articulation</u></p> <ul style="list-style-type: none"> Monitor assessment information from the CDE <p><u>Professional Learning</u></p> <ul style="list-style-type: none"> Further develop and implement assessments across the system (K-12, all classrooms) that are consistent with best practices Foster PD that builds capacity of science leaders to, create, use and modify assessments <p><u>Communication</u></p> <ul style="list-style-type: none"> Communicate with parents and stakeholders about new piloted assessments and shifts in state wide assessments

Action Plan Worksheet

Date:

1. Implementation Planning and Systemic Support

WHAT: Ensure **alignment of district/site policies & practices** to plan and implement NGSS in ways that systemically improve science teaching & learning.

HOW: Districts/sites provide leadership, support, & resources to align (NGSS, CCSS, ELD), scale & sustain professional development & leadership capacity. LCAP indicates resources to support science teaching and learning.

Goal	Evidence for Success (How will you know that the action step has been (a) completed (b) been a success?)	Benchmark/Action Steps (List specific actions needed to meet goal)	Resources needed (Human and financial)	Timeline (Start & End Dates)	Person(s) Responsible	Status

Action Plan Worksheet

Date:

2. Resources to Support the Implementation of NGSS Teaching and Learning

WHAT: Identify resource priorities and existing resources within the district to support the implementation of the NGSS.

HOW: Conduct an analysis of internal and external resources to support this work. Plan for obtaining and managing additional resources.

Objective	Evidence for Success (How will you know that the action step has been (a) completed (b) been a success?)	Benchmark/Action Steps (List specific actions needed to meet objective)	Resources needed (Human and financial)	Timeline (Start & End Dates)	Person(s) Responsible	Status

Action Plan Worksheet

Date:

3. Professional Learning (PL) Plan

WHAT: Build site and district instructional leadership capacity for teachers and administrators. Create professional learning opportunities that support the instructional shifts of the NGSS.

HOW: Teacher leaders, and district administrators and staff collaborate to provide ongoing professional learning (PD and PLC time) that increase teacher content knowledge and improve pedagogy.

Objective	Evidence for Success (How will you know that the action step has been (a) completed (b) been a success?)	Benchmark/Action Steps (List specific actions needed to meet objective)	Resources needed (Human and financial)	Timeline (Start & End Dates)	Person(s) Responsible	Status

Action Plan Worksheet

Date:

4. Students and Classroom Culture

WHAT: Develop a culture for student learning that is aligned with the shifts of the NGSS (Intellectual risk taking, questioning, student driven) and supports diverse students. Design a transition plan for building capacity of students to engage in the practices and teachers to shift their role in the classroom.

HOW: Create a communication plan and professional learning for teachers and leaders to support this cultural shift. Examine school and district data to ensure that all students have equitable access to science.

Objective	Evidence for Success (How will you know that the action step has been (a) completed (b) been a success?)	Benchmark/Action Steps (List specific actions needed to meet the objective)	Resources needed (Human and financial)	Timeline (Start & End Dates)	Person(s) Responsible	Status

Action Plan Worksheet

Date:

5. Data and Assessment

WHAT: Develop district capacity to assess students understanding of science and to use this data to inform both instructional and professional learning needs.

HOW: Learn how to create and implement 3-dimensional classroom level formative assessments. Develop district grade level assessments and process for analyzing.

Objective	Evidence for Success (How will you know that the action step has been (a) completed (b) been a success?)	Benchmark/Action Steps (List specific actions needed to meet the objective)	Resources needed (Human and financial)	Timeline (Start & End Dates)	Person(s) Responsible	Status

Action Plan Worksheet

Date:

6. Family, Community, and all other Stakeholders

WHAT: Create strong advocacy and community relationships for the improvement of science teaching and learning for all students.

HOW: Identify stakeholders, create compelling messaging for a broad range of stakeholders, and build strong partnerships.

Objective	Evidence for Success (How will you know that the action step has been (a) completed (b) been a success?)	Benchmark/Action Steps (List specific actions needed to meet the objective)	Resources needed (Human and financial)	Timeline (Start & End Dates)	Person(s) Responsible	Status*