

Position Statement

Approved by the CASE
Board of Directors
September 8, 2019

Providing Equitable Instructional Time for High-Quality Science in Elementary School

ISSUE

Education Code 51210 requires science instruction in and throughout grades one through six. The California Next Generation Science Standards (adopted in 2013) delineate science learning expectations in grades K-12 for all students every year. The California Curriculum **Framework** (approved in 2016) further details learning expectations for TK-12.

All elementary students, regardless of age, have the capacity to learn complex science when provided with scaffolded and developmentally appropriate opportunities to engage in the science practices (NRC 2011). High-quality science experiences at the elementary level spark student curiosity, interest, and reasoning abilities, and serve as the foundation for understanding the world around them and prepare them for future science learning.

CASE refers to the following description of high quality science learning environments which support/facilitate/enable high-quality science education:

High quality science learning environments are learner-centered, which includes the understanding that learners construct their own meaning through the practices of science and engineering, based on the beliefs, pre-conceptions, and cultural practices they bring into the classroom; content-centered, which includes a focus on sense-making, using the 3 dimensions of science to understand phenomenon or solve problems; and assessment-centered, which includes formative and summative assessments to make student thinking visible and to inform instruction.

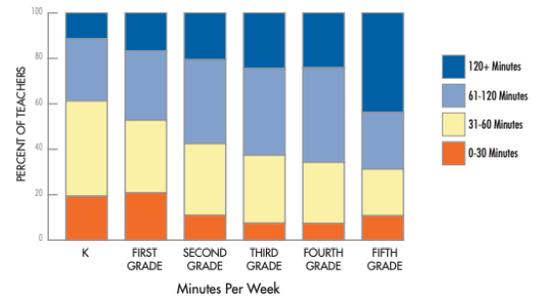
(HPL2018)



“Developmental researchers have shown that young children understand a great deal about basic principles of biology and physical causality, about number, narrative, and personal intent, and that these capabilities make it possible to create innovative curricula that introduce important concepts for advanced reasoning at early ages.” How People Learn: Brain, Mind, Experience, and School: Expanded Edition (2000)

A serious concern exists that science is and will continue to be marginalized at the elementary levels as demonstrated by past experiences. Available research indicates that a disproportionate amount of time in elementary classrooms is being spent on English Language Arts and Mathematics, as described in the 2018 Horizon Research Report (see Exhibit 2). The reality is that high-quality science is not a priority in grades TK-5, and students are not receiving adequate science instruction during these formative years in school.

Exhibit 2: Time Spent on Science Instruction in Elementary School



Source: 2011 Statewide Science Education Survey of Elementary School Teachers

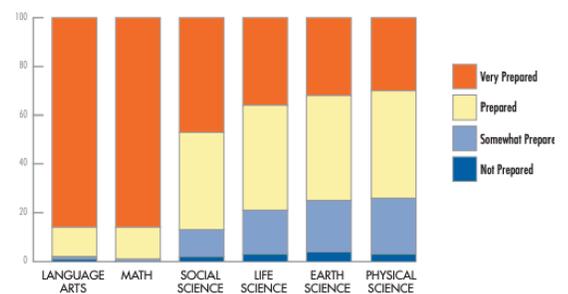
BACKGROUND

There are a variety of reasons underlying the lack of science learning opportunities in the state's elementary schools.

Findings from a 2011 report prepared by the Center for the Future of Teaching and Learning at WestEd and the 2018 Horizon Research Report, reveals that:

- Preparation Matters:** Elementary teachers do not feel confident with science content or age appropriate science practices, especially in comparison to their preparation to teach English language arts and mathematics, as shown in Exhibit 5.
- Professional Learning Matters:** There is a lack of access to or opportunities for professional learning in both pedagogy and content. Since adopting California NGSS in 2013, teachers have not received adequate training to teach science in elementary as reported in Figure 13.
- Instructional Materials Matter:** High-quality science teaching requires specialized materials, which teachers often lack, and districts and schools are strapped to provide these resources. Only 23% of CA districts are allocating funds for implementing CA NGSS (see Finding 2).
- Administrative Support Matters:** Constrained by the outdated notion of mandated minutes, many teachers do not feel that they are allowed to spend time teaching science and need the support of leadership and the school systems (schedules, professional learning, collaboration time, materials, etc.) to address this.
- Statewide Accountability Matters:** English-Language Arts and Mathematics are assessed in three elementary grades levels (3rd, 4th, and 5th), compared to one science assessment in 5th grade. Even though students are assessed on their cumulative understanding and practices from multiple years of science learning, science is still not prioritized in lower elementary grades. In addition, the science assessment data is not yet being displayed on the California Dashboard.

Exhibit 5: Elementary School Teachers' Self-Reported Preparedness to Teach Various Subjects



Teachers Participating in More Than 35 Hours of Subject-Specific Professional Development in the Last Three Years, by Subject and Grade Range

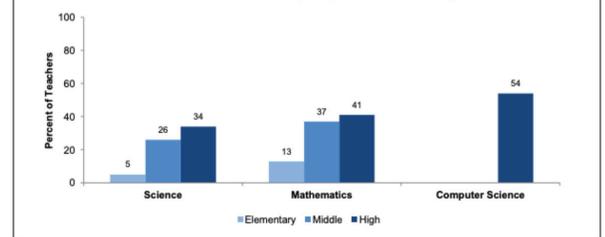
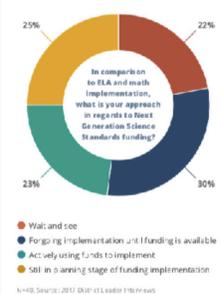


Figure 13

THE CENTER'S CA INSIGHTS
DOMAIN SPOTLIGHT ON NGSS
FINDING 2

Half of all district leaders we spoke with have not begun allocating funds toward NGSS implementation. An additional quarter of district leaders report still being in the planning stages for funding NGSS implementation.

FUNDING APPROACHES TO NEXT GENERATION SCIENCE STANDARDS IMPLEMENTATION



DECLARATIONS

California School Districts must ensure all students have consistent and equitable access to high-quality science education by providing teachers with research-based, developmentally appropriate, high-quality science instructional materials and ongoing professional learning opportunities.

CASE recommends high quality instructional time for science commensurate with other core subjects. It is imperative that the California State Board of Education implement policies that support the recommendations of the 2016 California Science Framework that ensure high-quality science instruction will take place for all children at all grade levels, especially the elementary level (TK-5).

There must be equitable instructional time in every school day, as compared to the other core subjects, to engage elementary students in high-quality science instruction that actively involves them in the processes of science.

CASE believes that, in order to provide equitable instructional time in every school day for high quality science instruction, the following must happen:

- **Preparation** – Teacher Preparation Programs must prepare elementary teachers so they are confident in their science content knowledge and age appropriate practices
- **Professional Learning** – School Districts must ensure that they provide ongoing access to or opportunities for professional learning in science pedagogy and content
- **Instructional Materials** – School districts must provide materials needed to equitably implement the NGSS in elementary schools
- **Administrative Support** – Administrators must allow and support elementary teachers in providing equitable instructional time for high quality science that mirrors instructional time spent on ELA and Math, as well as require it.
- **Statewide Accountability** – California Science Test (CAST) and California Alternate Assessment for Science (CAA for Science) must be included on the California School Accountability System (Dashboard) in an equitable manner.

REFERENCES

1. High Hopes, Few Opportunities: The Status of Elementary Science Education in California. 2011. Regents of the University of California <https://www.wested.org/resources/high-hopes-mdash-few-opportunities-full-report-the-status-of-elementary-science-education-in-california/>
2. Horizon Research, Inc. (2019). Highlights from the 2018 NSSME+. Chapel Hill, NC: Author <http://horizon-research.com/NSSME/wp-content/uploads/2019/01/Highlights-from-2018-NSSME.pdf>
3. NSTA Position Statement on Elementary Science Education, <https://www.nsta.org/about/positions/elementary.aspx>
4. National Research Council: Committee on a Conceptual Framework for New K-12 Science Education Standards: Board on Science Education. Division of Behavioral and Social Sciences and Education. (2007, in press for 2011). A framework of K-12 science education: Practices, crosscutting concepts, and core ideas. Washington, DC: The National Academies Press. <https://www.nap.edu/catalog/13165/a-framework-for-k-12-science-education-practices-crosscutting-concepts>
5. National Academies of Sciences, Engineering, and Medicine. 2018. How People Learn II: Learners, Contexts, and Cultures. Washington, DC: The National Academies Press. <https://doi.org/10.17226/24783>