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.

**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.
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**


