Policy Statement on Multilingual Learners

Position Statement
Approved by the
CASE Board of Directors
March 11, 2023

Issue

Inequitable outcomes exist today that are intrinsically linked to issues of statewide access to high-quality science education. Only 2.4% of Multilingual Learners (MLs) met or exceeded the state science standards on the 2021 CA Science Test (CAST). In comparison, though still unacceptable, 34% of English-only speaking peers met or exceeded that same test.

A 2021 ***report*** from the California Association for Science Educators (CASE) notes that despite adopting the California Next Generation Science Standards (CA NGSS) in 2013, CA NGSS implementation has yet to be evenly prioritized or supported by districts and administrators in California. Most teachers work in settings without materials aligned to the CA NGSS and have not received adequate professional learning in the CA NGSS nor have the preparation to address the linguistic needs of MLs in integrated content settings (Integrated ELD), resulting in a lack of access.

Misconceptions still exist that MLs first need to have proficiency in the disciplinary talk—the words, vocabulary, or definitions of science as a prerequisite to meaningfully engage in science learning. This notion leads to the practice of "frontloading" science concepts to language learners, an approach that is both ineffective and takes away their discovery. This traditional thinking is also the basis for removing MLs from the science classroom during designated English language instruction (dELD) and missing time devoted to science instruction, excluding students from the very opportunities they need to develop the specialized language for "doing" science.

Further, most California students have ***little, if any, exposure to high-quality science experiences while in elementary school.***

Position Statement

All students can engage in science practices and sense-making when provided with equitable learning opportunities. Policies and practices to support Multilingual Learners in science should be in place at every level of the California Education System.

The science classroom provides a rich science and collaborative environment for language learning where students engage in making sense of the natural and designed world. Integrated language development supports **(Integrated ELD)** based on the language demands for accessing and participating in the discipline are necessary to build content and disciplinary language. Science also

All students can engage in science practices and sense-making when provided with equitable learning opportunities. Policies and practices to support Multilingual Learners in science should be in place at every level of the California Education System.

presents rich opportunities for explicitly teaching language, leveraged during designated language support time **(Designated ELD)** and based on the language needs of MLs at specific proficiency levels.

Science instruction must shift towards embedded, context-focused vocabulary instruction and move away from pre-teaching concepts before the experience. Language learning occurs not as a precursor but as a product of using language in social interactions. For this reason, students must be afforded time to interact with their peers in learning and sensemaking. As such, we should eliminate scheduling practices that pull out students for supplemental instruction, such as language support, during science instruction.

Teachers play a critical and central role in teaching language in the context of science. They need professional learning time and support to revamp lesson plans and determine language opportunities and demands of the lesson.

Declarations

- Screen for the language and literacy demands of the science lesson (i.e., of the science and engineering practices) and provide supports to make content comprehensible.
- Capitalize on students' home language, knowledge, and cultural assets.
- Utilize culturally responsive and relevant practices to create inclusive science classrooms.
- Provide opportunities for students to engage in science practices using all their linguistic and visual resources.
- Guide students from their everyday language register to using specialized language to communicate their ideas.
- Encourage peer-assisted learning opportunities.
- Provide opportunities for language production and monitor progress.
- Provide explicit small-group support in literacy and ELD.
- Provide teachers of MLs with effective professional learning for integrated ELD science instruction; and for designated ELD instruction where appropriate.

Background

California's population is richly diverse in backgrounds and home lives. The Golden State has the largest Multilingual Learner population in the nation, with over 1,000,000 students (18%) attending public schools and more than 78 language groups represented throughout 1,000 districts. The term Multilingual Learners is used here because it describes students from an asset-oriented rather than a deficit-oriented frame, highlighting students' multiple resources and knowledge of languages in addition to English. In addition, it redefines the primary role of multilingual students as that of learners, not just English language learners.

Science instruction should recognize and value the linguistic and cultural experiences MLs bring to the classroom - their funds of knowledge. Focusing on these assets allows teachers to leverage students' prior experiences and knowledge about science concepts being taught and build upon them. Teachers

must understand the role of language in scientific sensemaking and attend to the linguistic challenges that MLs might encounter to ensure that all students have equitable learning experiences in the science classroom. They also need to understand the role of science instruction in language development.

English Language Development and Next Generation Science: Mutually Supportive Shifts

The advent of the 2012 CA English Language Development Standards (ELD/ELA) and the 2013 Next Generation Science Standards (NGSS) have brought about mutually supportive shifts in science and second language acquisition. These shifts promote a more socially-situated and practice-oriented view of learning in both fields, such that science instructional shifts promote language learning with MLs, whereas language instructional shifts promote science learning with MLs (Lee, 2017).

- The current emphasis for language acquisition is on the **functional use** of language - "what language does" (Okhee Lee's notion of **doing** language) rather than "what language is" from the previous ELD Standards, which focused on vocabulary and grammar. The ELD Standards call for supporting ML students to develop advanced proficiencies with academic English as they also develop content knowledge. Science teachers provide students with opportunities to use receptive language (listening, reading) and productive language (writing, speaking) for purposeful communication. A primary function of language is to provide a way to make sense of the world and share that sensemaking with others (communication).

- The NGSS has shifted science instruction from "knowing about discrete elements of science content" to "figuring out phenomena" and "designing solutions to problems" in collaborative groups, utilizing the Science and Engineering Practices (SEPs) as scientists and engineers do. If the phenomenon or problem is local and relevant to students' lives and communities, it will promote greater access and inclusion to science for all students. This approach gives students a purpose for learning science and a context for using language.

Science as Context for Language Development

The science classroom provides a rich science and language learning environment as students engage in making sense of the natural and designed world. NGSS three-dimensional, phenomena-driven science instruction supports the development of science content and language because:

- All students have science **experience** and **prior knowledge** from interacting in the natural world. They must receive instruction that values these funds of knowledge (experiences, home cultures, and primary languages) as assets and build from them.

- Phenomena-driven science instruction taps into our **natural curiosity** and **engages** and **motivates** learners. It provides MLs with authentic contexts and purposes to use their developing language as they genuinely desire to communicate their discoveries. The use of local phenomena, in particular, brings science to students and promotes access to science and the inclusion of all students in the science classroom.

- Doing science and engineering, in particular engaging in the Science and Engineering Practices (developing models, constructing explanations, arguing from evidence), is language intensive and inherently involves multiple forms of language use (National Research Council, 2012; Lee, Quinn & Valdés, 2013; Lee & Stephens, 2019). Communicating in the science classroom involves multiple communication channels or **modalities**, not just the four language domains (listening, speaking, reading, and writing). It also uses drawings, symbols, graphs, tables, equations, gestures, and various visual modalities to communicate ideas. Nonlinguistic modalities can be particularly beneficial to multilingual learners, especially at the beginning levels of English proficiency. However, drawings,

> Nonlinguistic modalities are essential to engaging in science practives and especially beneficial to MLs.

symbols, tables, and graphs are not just scaffolds toward language; they are how scientists communicate their ideas. Through various modalities, students engage in productive discourse and interactions with their peers and the teacher, using their emerging language to communicate their emerging thinking.

- Language Learning occurs **not as a precursor but as a product of using language** in social interactions (Valdés, 2015). Misconceptions still exist that "a certain level of English proficiency is a prerequisite to meaningfully engage in STEM learning" (NASEM, 2018, p. 2), that MLs "must be proficient in English before they can be successful in content area classes" (NASEM, 2018, p. 44), and that "for participation in STEM subjects, ELs first needed to have proficiency in the disciplinary talk—the words, vocabulary, or definitions" (NASEM, 2018, p. 98). This notion leads to the practice of "frontloading" science concepts to language learners, an approach that is both ineffective and takes away their discovery. This traditional thinking is also the basis for excluding MLs from rigorous grade-level science instruction, excluding students from the very opportunities they need to develop the specialized language for "doing" science. The hands-on experience is the frontloading in science, and the concepts are anchored in students' real-life experiences. With the support of the teacher and peers, students shift **registers**, the continuum of ways language is used in different contexts or for different purposes, from an everyday register ("home language") to a specialized register of the discipline, as they struggle to communicate their experiences.

- **Meaning-making** through the SEPs requires intensive interaction of all students. They work together as a community toward the common goal of explaining a phenomenon by engaging in various interactions. These include one-to-one interactions (for example, one student talking to a partner), one-to-small group interactions (one student talking to a small group), one-to-many interactions (one student talking to class), and small group-to-many (a small group talking to the class). This collaboration provides opportunities for the use of language, which is valued for the meaning conveyed rather than its accuracy. Emerging language is not a barrier to understanding science. When scaffolded appropriately, language learners use their less-than-perfect target language to understand and communicate their science ideas. As learners use language as a tool to communicate their scientific discoveries and sense-making, they develop their science understanding and language proficiency in tandem. In this context, oral language practice is key, given that "Whoever is doing the talking is doing the learning…."

> Specialized language, rather than being a precursor, is a product of learning science through social interactions–doing science and using languace

- **Student learning** can be assessed by designing and scaffolding assessments that allow students to use multiple modalities, respond using everyday and specialized registers, and engage in various interactions. Assessment should prioritize meaning over linguistic accuracy.

Integrated and Designated ELD in Science

The science classroom provides multiple opportunities to hear and use language. The phenomenon-based and hands-on context creates engagement and the desire to communicate ideas using a variety of modalities and registers. Students are supported in using the target language through strategic and temporary scaffolds. This **integrated** language development support is based on the language demands for accessing and participating in the discipline and builds both content and disciplinary language.

Science also presents rich opportunities for explicitly teaching language, leveraged during **designated** language support time and based on the language needs of MLs at specific proficiency levels that require targeted attention and practice. Because science and other content classes provide the context for learning language, the designated ELD time should not be a "pull-out" program during their content classes.

Citations/Resources

1. Report of Findings: Status of Science Implementation in California 2019-2020
   Results from the Science Implementation survey administered in 2020 to California educators by the California Association of Science Educators.
   https://cascience.org/application/files/3816/3857/8886/FINAL_CASE_NGSS-SurveyReport.pdf
2. California English Language Development Standards (Electronic Edition)
   Kindergarten Through Grade 12.
   https://www.cde.ca.gov/sp/el/er/documents/eldstndspublication14.pdf
3. NYU SAIL RESEARCH LAB
   Integrating Science And Language For All Students With A Focus On English Language Learners
   https://www.nyusail.org/webinars
4. English Learners in STEM Subjects: Contemporary Views on STEM Subjects and Language With English Learners, Okhee Lee and Amy Stephens, 2019
5. Exploring Science and English Language Development: Implications for Professional Learning, Exploratorium Institute for Inquiry Conference, January 2015.
   https://drive.google.com/file/d/1bzoQFqdt0saB6ULH4C9FP1MOv7eRCZCR/view
6. Lee, O., Grapin, S., & Haas, A. (2018). How the NGSS science instructional shifts and language instructional shifts support each other for English learners: Talk in the science classroom. *In Language, Literacy, and Learning in the STEM Disciplines* (pp. 35–52). Routledge.
7. Lee O, Llosa L, Grapin S, Haas A, Goggins M. Science and language integration with English learners: A conceptual framework guiding instructional materials development. Science Education. 2019;103:317–337.
   https://doi.org/10.1002/sce.21498
8. National Academies of Sciences, Engineering, and Medicine 2018. *English Learners in STEM Subjects: Transforming Classrooms, Schools, and Lives.* Washington, DC: The National Academies Press.
   https://doi.org/10.17226/25182.
9. Cecilia Silva, Molly Weinburgh, Robert Malloy, Kathy Horak Smith & Jenesta Nettles Marshall (2012). Toward Integration: An Instructional Model of Science and Academic Language, Childhood Education, 88:2, 91–95, DOI: 10.1080/00094056.2012.662119