FROM FRAMEWORKS TO CLASSROOMS:

Promising Practices for California English Learners/ Emergent Bilinguals in STEM

Research Brief
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This brief describes how the Sobrato Early Academic Language (SEAL) approach has already been helping educators equitably implement California's English learner (EL) policies as well as how the SEAL model offers promising practices for equitable implementation of the proposed Mathematics Framework.

INTRODUCTION

The California Department of Education (CDE) will soon release a new Mathematics Framework (CDE, 2022c) that includes linguistically and culturally responsive practices intended to support all students, including English learner/emergent bilingual (EL/EB) students.[1] The passage of this new framework is crucial to our state's future: jobs in teaching and in science, technology, engineering, and mathematics (STEM) fields offer professional and economic opportunities for all students and their families, and global industries are increasingly recruiting multilingual STEM talent (American Council on the Teaching of Foreign Languages, 2019). STEM careers could transform the lives of ELs/EBs, and at the same time, ELs/EBs could transform the STEM landscape.

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Historically, too few ELs/EBs have been able to pursue a STEM career because they have been excluded from learning STEM subjects, beginning in the elementary grades (Callahan & Humphries, 2017). For years, many policy makers and educators as well as the general public promoted "English only" approaches in classrooms.[2] Often pulled out of core instruction to attend English language development or English as a second language classes and relegated to lower level content instruction, EL/EB students have long been deprived of access to the full curriculum, including rigorous STEM instruction.

California's EL policy landscape began to change in 2016, when the CDE implemented the English Language Arts/English Language Development (ELA/ELD) Framework (CDE, 2015). As this framework and the policies that followed it made clear, students' home languages are assets in the classroom, and EL/EB students can and should be exposed to rigorous content while they are learning English. The new 2023 Mathematics Framework provides an opportunity to extend this trajectory.

Although the new math framework will shine a much-needed spotlight on ELs/EBs, it cannot elaborate best practices in depth. For this reason, the framework's release provides an opportunity to revisit a document that does: the 2018 National Academies of Science, Engineering, and Medicine

(NASEM) report *English Learners in STEM Subjects: Transforming Classrooms, Schools, and Lives.* This report, which was written in response to the 2013 Common Core Mathematics and Next Generation Science Standards requiring "complex social and academic use of language" (NASEM, 2018, p. 15), gathers research on best STEM education practices for ELs/EBs. The report also provides detailed and expert research-based guidance on how to close the gap between California's EL/EB policy guidance and the realities of teaching and learning in the classroom.

Since 2008, Sobrato Early Academic Language (SEAL) has been using such research-based guidance to help districts implement the kinds of equitable and effective practices that reflect the general recommendations contained in the NASEM report. SEAL works with preschool and elementary school educators to enact asset-based and research-based best practices for ELs/EBs. Drawing on four key findings from the NASEM report that have implications for the rollout and implementation of California's new Mathematics Framework, this brief describes how the SEAL approach has already been helping educators equitably implement California's EL policies as well as how the SEAL model offers promising practices for equitable implementation of the new Mathematics Framework.

BACKGROUND

In California, 1.128 million students in the K–12 system are classified as ELs (CDE, 2022a, 2022b)—almost one in five students—and nearly 60% of children under age six are learning English in addition to their home languages (Holtby et al., 2017).

These young people are not peripheral to our education goals. Rather, their needs must be at the heart of how we think about and implement education policies and practices in the state.

California has some of the strongest EL policies in the nation. In 2017, the State Board of Education passed the English Learner Roadmap (CDE, 2017), which provides guidance to local educational agencies as they welcome, seek to understand, and educate California's diverse population of ELs/EBs. California's education frameworks, which offer educators and curriculum publishers guidance on linking state standards to curricula and classroom practices, are also steeped in EL research.

The ELA/ELD Framework, adopted by the State Board of Education in 2014, broke new ground in California (CDE, 2015). By officially aligning ELA and ELD standards, the framework explicitly centered the needs of ELs, making it clear that language must be taught throughout every content area. The framework placed California at the national forefront of EL research, best practices, and pedagogy by insisting that home

language and culture are assets, that content knowledge and language must be developed in tandem, and that all students benefit from a comprehensive approach to literacy wherein "the responsibility for learners' literacy and language development is shared" (CDE, 2017, p. 8). In 2020, the CDE published *Improving Education for Multilingual and English Learner Students: Research to Practice*, a resource providing practitioners and administrators with actionable examples of research-based pedagogy designed to help all California teachers be language teachers" (CDE, 2020).

The examples provided in this brief illustrate the proven as well as the potential success of the SEAL model for professional learning that guides educators and district and site leaders in implementing quality STEM learning for all students in the classroom.

The much-anticipated 2023 passage of the Mathematics Framework should constitute another breakthrough for ELs/EBs. The current draft (CDE, 2022c), with its clear focus on equity for all students—including ELs/EBs—and its insistence that language development be taught in and through math instruction, is poised to extend the state's history of taking seriously research on best education practices for ELs/EBs.

Changing practices and implementing research-based, visionary policies and frameworks are complicated processes, though. State guidance is crucial, but it is only a first step in ensuring that ELs/EBs receive high-quality education.

This brief will help educators enact equitable and effective practices that align with the 2018 NASEM report as well as potentially support implementation of the proposed Mathematics Framework. Four findings from the NASEM report have implications for applying the proposed framework, related to these key areas: **classroom culture, curriculum materials, instruction, and professional learning.** This brief will describe the NASEM report's findings in these key areas, outline how the new Mathematics Framework can lay the groundwork for positive change in each area, and give examples of how districts implementing the SEAL model are already transforming STEM learning for ELs/EBs in elementary schools. The examples provided in this brief illustrate the proven as well as the potential success of the SEAL model for professional learning that guides educators and district and site leaders in implementing quality STEM learning for all students in the classroom.

SEAL as a Proven Model for Implementing Best Practices for EL/EB Students

FINDING ONE

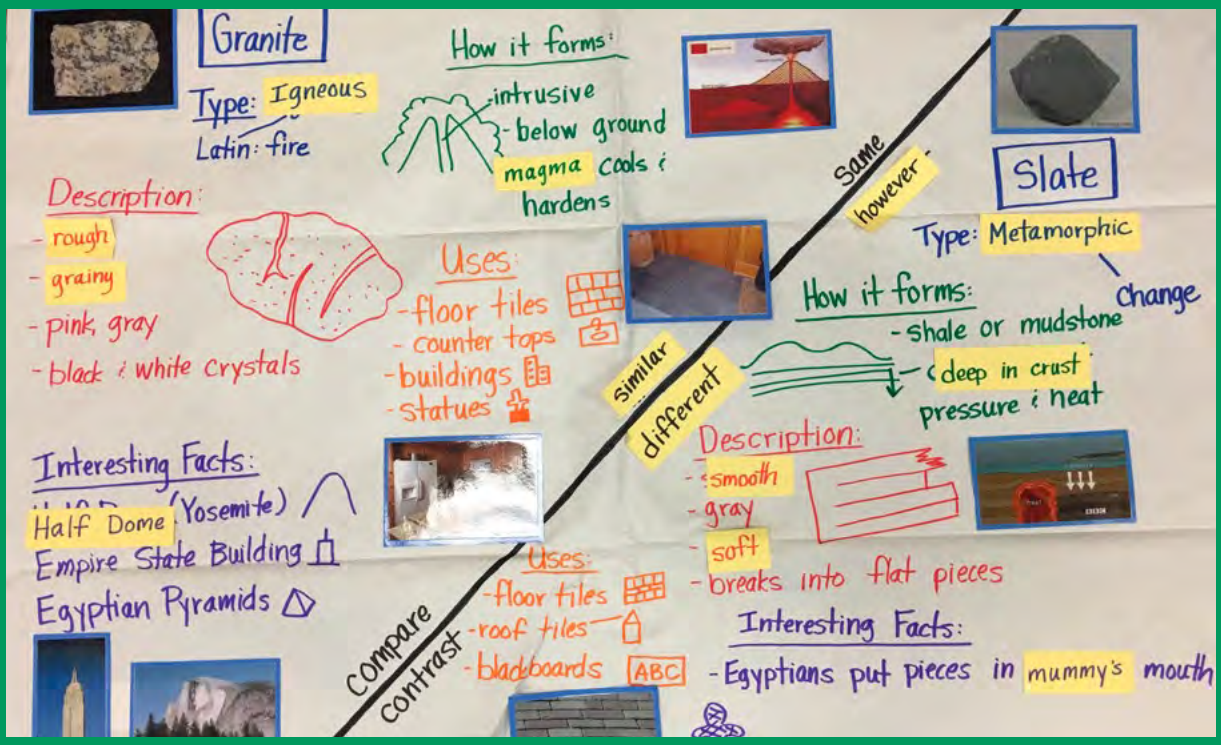
Classroom culture must be inclusive and affirming, leveraging the many assets afforded by ELs/EBs. Changing classroom culture requires a seismic shift that begins with beliefs.

The NASEM report found that teachers' knowledge and beliefs about ELs/EBs have a significant impact on students' STEM learning (NASEM, 2018, Chapter 4). ELs/EBs thrive in an asset-based classroom climate where they can meaningfully participate in inquiry-based STEM learning. Yet many educators assume that ELs/EBs have more deficits than assets when it comes to learning STEM topics. Some teachers may, for example, conflate a lack of English language proficiency with a lack of STEM content understanding, capacity, or prior knowledge.

Teachers may not be aware of rich EL/EB cultural traditions that have the potential to help all students grasp new STEM concepts. Educators may moreover view mathematics as inherently devoid of language and thus purely symbolic in nature, thereby inadvertently neglecting to put in place the supports needed by ELs/EBs presented with, for example, math problems posed, explained, and solved in English. Further, some teachers and policies set a threshold of English proficiency before ELs/EBs can be enrolled in STEM classes. Perhaps most importantly, the report found that even when teachers understand the assets that students bring to their classrooms, it may be difficult for educators to apply this understanding to their own classroom practices.

"California's Mathematics Framework draft states plainly that students' cultural backgrounds, experiences, and languages are resources for learning mathematics and that all students are capable of achieving a deep understanding of math." The Mathematics Framework recommends an assets-based approach that recognizes "multilingualism as a power" (CDE, 2022c, Chapter 2, "Equity and Engagement: An Introduction").[3]

Across the state, teachers trained in the SEAL model are intentionally creating affirming environments using strategies designed to welcome students' intersectional identities. Strategies such as Home Language Interviews,

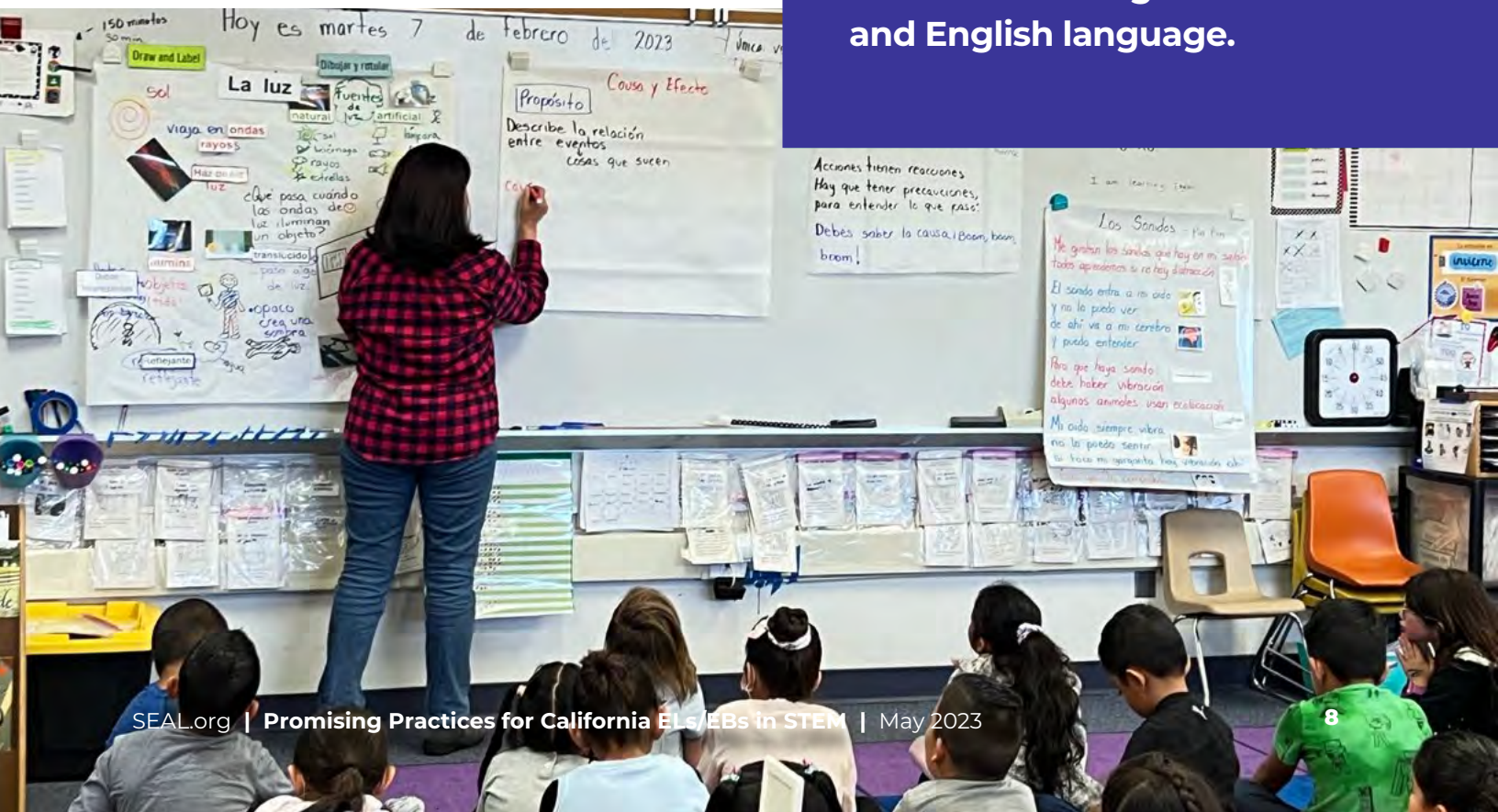


When language and content are taught in tandem, both develop powerfully.

in which teachers invite students to share about their home languages, and Pathway to Biliteracy Boards, which create space in the classroom to celebrate all things multilingual, showcase not only students' home languages and cultures but also the value of multilingualism. Through SEAL's professional development series, teachers learn strategies for pursuing family partnerships to tap into students' funds of knowledge and invite families into the classroom to share their expertise and experience as well as to celebrate student learning. SEAL teachers are experts in leveraging home languages for English learning through crosslinguistic transfer strategies, such as cognate walls or metalinguistic anchor charts that compare, for example, adjective–noun placement in English and Spanish. Teachers become adept at recognizing which linguistic patterns transfer from one language to another and which don't. They use this information to help students bridge what they know from one language to another. This kind of language transfer is particularly salient for Spanish-speaking ELs/EBs in STEM because of the number of Latin-based cognates found in scientific vocabulary in both languages.

The use or neglect of these and similar practices has serious implications for math learning because stubborn inequities persist (CDE, 2022c, Chapter 1, "Mathematics as Launch Pad or Gatekeeper?"). The Mathematics Framework draft asserts: "Fixed notions about student ability have led to considerable inequities in mathematics education" (CDE, 2022c, Chapter 1, "Seeing Opportunities for Growth").

SEAL teachers work to unlearn a fixed-mindset approach with the aim of not only celebrating home languages but also leveraging them for learning both content and English language.



FINDING TWO

Curriculum materials in science and math have not been adequately designed to support the needs of ELs/EBs.

The NASEM report concludes that published curricula do not pay sufficient attention to language diversity, nor do they provide authentic opportunities for ELs/EBs to participate meaningfully in classroom tasks and activities (NASEM, 2018, Chapter 4). There is limited space for differentiation as well as a lack of integrated language development in current curricular materials. When these do not meaningfully attend to language development or provide for the differing language needs of diverse students, teachers using such materials may fail to meet the needs of ELs/EBs.

Even when published material takes the needs of ELs/EBs into account, teachers must supplement existing curricula with examples that are relevant to students and draw on their specific cultural and linguistic assets.

The Mathematics Framework draft's guidelines for instructional materials recommend that publishers focus on the needs of ELs/EBs in particular by including strategies in line with California's ELA/ELD standards (CED, 2022c, Chapter 13, "Access and Equity"). The framework also recommends that all curricular materials include guidance on differentiation to meet the needs, including the language needs, of all students.

Even when published material takes the needs of ELs/EBs into account, teachers must supplement existing curricula with examples that are relevant to students and draw on their specific cultural and linguistic assets. SEAL teachers meet the needs of their EL/EB students by collaborating with colleagues to identify the languages demanded by curriculum materials as these relate to both content and ELA/ELD standards. In the SEAL approach, small-group, targeted instruction informed by ELA/ELD standards and by ELs' language-development needs prepares ELs for subsequent whole-class instruction so that ELs can participate alongside their peers who are proficient in English. In addition, SEAL teachers actively seek opportunities to respond to the needs of their EL/EB students. This active monitoring, combined with a strong knowledge of ELA/ELD standards, enables SEAL educators to provide scaffolds and supports aimed at ensuring that ELs/EBs can access grade-level content and engage with tasks and lessons while also finding authentic opportunities to develop their language abilities.

FINDING THREE

Teachers should use instructional strategies that support ELs/EBs with meaningful engagement, including with peers, in rigorous disciplinary practices in math and science.

To integrate ELs/EBs into STEM classes fully, educators need support to learn and implement classroom strategies and curricula that build their own multilingual teaching competencies (NASEM, 2018, Chapter 4). "Teachers are both on the front line and responsible for the bottom line" (Gándara et al., 2005, p. 2) in providing ELs/EBs with the tools they need to excel in STEM disciplines. Classroom instruction is the key ingredient for EL/EB success. Because the SEAL model focuses on transforming practice in classrooms, this section on instruction is the most in depth.

The new Mathematics Framework draft addresses classroom instruction for ELs/EBs in broad strokes, advising that students receive language support, interact with peers, and have access to high-level content with supports in place to ensure meaningful intellectual engagement (CED, 2022c, Chapter 9, "A History of Tracking in Mathematics"). These supports include providing opportunities for group work, making work visual, scaffolding learning and language development, and creating opportunities for prelearning (CED, 2022c, Chapter 2, "Equity and Engagement: An Introduction"). The NASEM report recommends five evidence-based instructional practices that are similarly grounded in language support, interaction with peers, and engagement in meaningful content-related activities (NASEM, 2018, Chapter 4), which are already being implemented with EL/EB populations across the state through SEAL instructional practices.

ENGLISH LEARNERS/EMERGENT BILINGUALS AND STEM

FINDING THREE: FIVE EVIDENCE-BASED INSTRUCTIONAL PRACTICES.

1

Engage students in disciplinary practices.

Learning should be experiential and collaborative.

SEAL classrooms develop six-week content-based thematic units based on grade-level standards.

2

Engage students in productive discourse and interactions with others.

Don't underestimate the value of student talk. Scaffold student language production and structure interactions between students and teachers as well as among students.

Many SEAL strategies (e.g., pairing sentence frames with related graphic organizers for conversations in partnerships and small groups) are structured to promote higher order thinking as well as precise language. SEAL educators also employ strategies like songs and chants embedded with high-level vocabulary.

3

Encourage students to use multiple registers and modalities.

Multiple modalities are essential to "doing" science and mathematics.

SEAL classrooms provide ELs/EBs with multiple opportunities to use their full linguistic repertoire—including their home languages—to process their thinking with peers and communicate their ideas.

4

Leverage multiple meaning-making resources.

Teachers can help students use their resources to make meaning of new concepts in English.

SEAL teachers regularly encourage ELs/EBs to access their home languages as a foundation for deepening content understanding and developing English.

5

Provide explicit focus on how language functions in the discipline.

Teachers should foster vocabulary development within the context of, for example, a math or science class. When language becomes an integral part of content activities, students begin to grasp how English works.

SEAL teachers regularly deconstruct complex text and analyze authors' use of language to refine student use of sophisticated language structures.

1 Engage students in disciplinary practices.

According to the NASEM report, to learn STEM subjects effectively, ELs/EBs must:

(a) engage with intellectually challenging curricula,

(b) have opportunities to grapple with new ideas,

(c) build on what they know,

(d) solve problems, and

(e) communicate their understanding of science and math concepts to others (NASEM, 2018, Chapter 4).

Learning should be experiential and collaborative; crucially, it should also continually build students' ability to use the academic language required of the discipline being studied.

Teachers in SEAL classrooms develop six-week, content-based thematic units based on grade-level standards. Students learn language in the context of rigorous intellectual inquiry as part of science and social studies curricula. For example, in a second-grade study of the atmosphere and climate, young "meteorologists" use academic language such as "drought," "severe weather," and "effects" as they conduct experiments at inquiry centers and collaborate in groups to study and solve weather-related math problems throughout the unit. In this way, students learn language and content in tandem, engaging with their peers in inquiry-related activities where language development is fostered authentically.

2 Engage students in productive discourse and interactions with others.

The NASEM report concludes that while some teachers may underestimate the value of student talk, erroneously assuming that focusing on vocabulary lists can adequately support group work and discourse, best practices include scaffolding student language production and structuring interactions between students and teachers as well as among students (NASEM, 2018, Chapter 4).

SEAL teachers model high-level academic language as well as sophisticated language structures for students. Many SEAL strategies are structured to promote higher order thinking as well as precise language. For example, students continually process their thinking by talking with partners. These conversations are supported by scaffolds such as sentence frames and graphic organizers. Students are encouraged to use academic vocabulary and/or sentence frames in their partner discussions. A teacher might ask students to work with a partner to compare and contrast a square with a rhombus, providing them with sentence frames such as:

"While squares have _____ , ■ ◆ rhombuses have _____ ."

"Similarities between squares and rhombuses include ■ ◆ _____ ."

SEAL educators also employ strategies like songs and chants embedded with high-level vocabulary, such as a "geometry rap" or a "climate cadence." Discussion protocols (e.g., Socratic seminar and reciprocal teaching) offer older students the opportunity to use conceptual language regarding current topics like climate change and conservation. These and similar strategies require students to engage metacognitively when teachers ask: "What made you think that? How did you arrive at that answer?" Metacognition allows students to uncover misconceptions and develop deeper analytic skills. All SEAL units culminate in formal oral presentations, which ensure that students have ample opportunities to practice academic vocabulary, contribute productively, listen to their peers, and work together to learn how to reason and communicate their thinking.

3 Encourage students to use multiple registers and modalities.

The NASEM report explains that student talk varies across settings, and students use different skills and techniques to communicate in each setting (NASEM, 2018, Chapter 4). For example, students may be encouraged to use a formal register with precise language when making a presentation, whereas small-group and one-on-one interactions allow for more casual conversation and nonlinguistic forms of communication like gestures. In addition to formal and informal registers, students use different modalities to convey their ideas, including speaking, reading, and writing, which they can supplement with pictures, symbols, graphs, tables, equations, and models. Multiple modalities are essential to "doing" science and mathematics, and ELs/EBs benefit greatly from their use. The report concludes that encouraging students through explicit instruction to use a variety of communication methods is critical for ELs/EBs, especially in STEM subjects.

SEAL classrooms help students shift registers across thematic units and lessons, providing ELs/EBs with multiple opportunities to use their full linguistic repertoire—including their home languages—to process their thinking with peers and communicate their ideas.

Students engage with peers in inquiry, sharing, discussion, cooperative learning, research, and presentations, learning to build on one another's ideas, share and integrate information, and develop the skills necessary for working together. "Mathematicians" routinely explain their answers, describing, for example, how they come to know that 4 is bigger than –5. "Meteorologists" routinely analyze images depicting the effects of weather, examine tables and graphs to identify weather-related trends, and build models to explore and make tangible the concept of climate change. During small-group-designated ELD instruction, teachers work with ELs/EBs on precise language structures so that they can readily move into formal registers for final projects that include oral presentations and written tasks.

4 Leverage multiple meaning-making resources.

ELs/EBs bring to the classroom a wide range of knowledge, values, and ways of looking at the world that "may be discontinuous with Western scientific practices" (NASEM, 2018, p. 117). Teachers can help students use their resources to make meaning of new concepts in English; "however, all too often, these intellectual and cultural resources are undervalued," write the authors of the NASEM report, "because teachers do not easily recognize them as being relevant or valuable" (NASEM, 2018, p. 116). If teachers help students leverage similar grammatical structures, cognates, and existing content knowledge, ELs/EBs have advantages in making use of the language of science and mathematics.

In SEAL classrooms, children's cultures and identities are woven not only into the classroom environment but also into the curriculum. Teachers include real-world connections that make content relevant to all, providing opportunities for students to use their full linguistic and cultural repertoire to process content via academic process journals. Teachers also design "transfer" activities that help students access what they know in one language and apply it to the other. SEAL teachers regularly encourage ELs/EBs to access their home languages as a foundation for deepening content understanding and developing English. Through "home–school connection," families are encouraged to use their home languages in regular at-home activities related to content.

5 Provide explicit focus on how language functions in the discipline.

Too often, educators emphasize building English vocabulary in isolation when they should be fostering vocabulary development within the context of, for example, a math or science class (NASEM, 2018, Chapter 4). Focusing heavily on vocabulary can take time away from active student engagement with science or math concepts and may constrain classroom discourse, preventing students from talking and thinking like scientists. Instead, educators can use metalanguage (e.g., calling attention to student use of "sequence" language) to be explicit about how language presents the knowledge to be learned. When language becomes an integral part of content activities, students begin to grasp how English works.

The SEAL model is founded on the understanding that language is much more than vocabulary lists related to content. In math, SEAL teachers not only focus on important content words (e.g., quadrilateral, blueprint, parallel) but also identify key language functions appropriate to content and discipline. For example, students use "compare and contrast" language to explain how they know whether a shape is a rhombus, a square, or a rectangle. This language function is taught using graphic organizers and increasingly sophisticated sentence structures. Students with beginning English proficiency are prompted with sentence frames such as:

"Both the _____ and _____ have _____."

To deepen proficiency, teachers encourage students to use increasingly complex frames such as:

"Similarities between _____ and _____ include _____. However, a _____ differs from a _____ in that _____."

Students collaborate daily in small groups where they can continue to use these sophisticated language structures to express themselves with linguistic precision and deepen their proficiency with vocabulary and language function through peer interactions. Teachers regularly deconstruct complex text and analyze authors' use of language to refine student use of sophisticated language structures. SEAL students effectively become "language detectives," using strategies that promote metalinguistic awareness while being steeped in disciplinary content learning.

FINDING FOUR

Transforming STEM instruction requires high-quality professional learning and collaboration for teachers.

Building a system that supports all students requires reform at all levels (NASEM, 2018, Chapter 6). It is not enough to implement stand-alone strategies without also changing the larger educational environment. School districts must ensure that educators implement methods based on current research regarding how best to support the development of ELs/EBs across content areas. To do this, NASEM recommends professional development, robust materials, instructional coaching, and adequate paid time for collaboration for educators.

The Mathematics Framework dedicates an entire chapter to "Supporting Educators in Offering Equitable and Engaging Mathematics Instruction" (CDE, 2022c, Chapter 10). Chief among these supports is ongoing professional learning that includes collaboration and instructional coaching as well as access to appropriate curricular materials.

SEAL offers a variety of professional learning options designed to promote EL/EB-focused systems change. The full SEAL model, for example, provides professional learning over two years, with unique components targeted at meeting the needs of teachers, instructional coaches, site principals, and district administrators. At regular intervals, teachers from across the district come together in grade-level teams to plan units and lessons that focus on content and language. In addition to providing real-time coaching in classrooms, instructional coaches guide this grade-level collaboration to develop culturally responsive curricula that center the needs of ELs/EBs. Administrators support the needs of teachers by facilitating regular grade-level collaboration to prepare specially designed lessons that foster ELD–STEM content for their ELs/EBs.

CONCLUSION

The majority of California children under the age of six come from homes where a language other than English is spoken.

The linguistic and cultural diversity represented by these young people is a local, state, and global asset. If we do not provide the educational experiences that ELs/EBs need to succeed and thrive in our public schools, we compromise their future as well as that of our state.

Since 2008, SEAL has been using research-based guidance to help districts implement the kinds of equitable and effective practices recommended by the NASEM report on ELs in STEM subjects. In line with the first three findings detailed in this brief, **SEAL teachers cultivate inclusive and affirming classroom cultures that celebrate multilingualism as an asset; actively engage with math and science curricular materials, transforming them to be responsive to students' language and content needs; and provide ELs/EBs with multiple opportunities for rigorous, scaffolded engagement with math and science content.** This level of high-quality support for ELs/EBs would not be possible without a professional development model that helps teachers understand research and then implement research-based strategies, as described in the fourth finding. If we choose, as SEAL districts have, to invest in our collective future by nurturing the gifts that ELs/EBs and their families bring to their classrooms and communities, we can foster the confident, capable, and creative citizens that our state and nation need.

ENDNOTES

1 The term *English learner* (EL) or *English language learner* refers to students in K–12 education who have a home language other than English and do not have sufficient English proficiency to participate without support in an academic program taught in English. The field of EL education is moving toward the use of asset-based terminology that recognizes students as, for example, multilingual learners or emergent bilinguals. In this brief, we use the term *English learner/emergent bilingual* to acknowledge the legal and policy landscape while taking an asset-based approach.

2 These policies culminated in 1998 with the passage of Proposition 227, which dramatically decreased bilingual education in California.

3 Because the Mathematics Framework is still in draft form, quotations will be cited by chapter and section rather than by page number.

REFERENCES

American Council on the Teaching of Foreign Languages. (2019). *Making languages our business: Addressing foreign language demand among U.S. employers*. https://www.leadwithlanguages.org/wp-content/uploads/MakingLanguagesOurBusiness_FullReport.pdf

California Department of Education. (2015, July). *English language arts/English language development framework for California public schools, kindergarten through grade twelve*. https://www.cde.ca.gov/ci/rl/cf/elaeldfrmwrksbeadopted.asp

California Department of Education. (2017). *California English learner roadmap State Board of Education policy: Educational programs and services for English learners*. https://www.cde.ca.gov/sp/el/rm/elroadmappolicy.asp

California Department of Education. (2020). *Improving education for multilingual and English learner students: Research to practice*. https://www.cde.ca.gov/sp/el/er/documents/mleleducation.pdf

California Department of Education. (2022a). *English learners in California schools*. https://www.cde.ca.gov/ds/sg/englishlearner.asp

California Department of Education. (2022b). *Facts about English learners in California*. https://www.cde.ca.gov/ds/ad/cefelfacts.asp

California Department of Education. (2022c). *Mathematics framework* [Second field review]. https://www.cde.ca.gov/ci/ma/cf/

Callahan, R. M., and Humphries, M. (2017). Undermatched? School-based linguistic status, college going, and the immigrant advantage. *American Educational Research Journal, 53*(2), 263–295. https://doi.org/10.3102/0002831215627857

Gándara, P., Maxwell-Jolly, J., & Driscoll, A. (2005). *Listening to teachers of English language learners: A survey of California teachers' challenges, experiences, and professional development needs*. Center for the Future of Teaching and Learning. https://www.wested.org/resources/listening-to-teachers-of-english-language-learners-a-survey-of-california-teachers-challenges-experiences-and-professional-development-needs/

Holtby, S., Lordi, N., Park, R., & Ponce, N. (2017, May). *Families with young children in California: Findings from the California health interview survey, 2011–2014, by geography and home language* [Policy brief]. UCLA Center for Health Policy Research (PB2017-3), 1–8.

National Academies of Science, Engineering, and Mathematics. (2018). *English learners in STEM subjects: Transforming classrooms, schools, and lives*. National Academies Press. https://doi.org/10.17226/25182

About SEAL

The SEAL model is designed to build the capacity of preschools and elementary schools to develop the language and literacy skills of English Learners and Dual Language Learners. Its model delivers language-rich, joyful, and rigorous education for all children. SEAL provides professional development, curriculum support, and technical assistance to school systems—which bolsters learning for all children and is especially critical for English Learners.

SEAL currently serves

50,000 Students

113 Elementary schools

132 Preschool classrooms

1,600 Teachers

24 Preschool partners

24 Local education agencies