

Quality Algebra Learning for English Learners and Latino Students

A Scan of State Outcomes and Initiatives

Haiwen Chu

David Lopez

Saroja Warner

September 2026

© 2026 WestEd. All rights reserved.



Suggested citation: Chu, H., Lopez, D., & Warner, S. (2026). *Quality algebra learning for English Learners and Latino students: A scan of state outcomes and initiatives*. WestEd.

WestEd is a nonpartisan, nonprofit organization that aims to improve the lives of children and adults at all ages of learning and development. We do this by addressing challenges in education and human development, increasing opportunity, and helping build communities where all can thrive. WestEd staff conduct and apply research, provide technical assistance, and support professional learning. We work with early learning educators, classroom teachers, local and state leaders, and policymakers at all levels of government.

For more information, visit [WestEd.org](https://www.wested.org). For regular updates on research, free resources, solutions, and job postings from WestEd, subscribe to the *E-Bulletin*, our semimonthly e-newsletter, at [WestEd.org/subscribe](https://www.wested.org/subscribe).

Acknowledgment of Support

This publication was developed with support from UnidosUS as part of the Math Policy Project.

Project Origin and Purpose

WestEd undertook this study in response to UnidosUS's Math Policy Project to advance a research-informed policy agenda for improving student success rates in Algebra I by 9th grade and college-level Math 101 during the freshman year, with a special focus on solutions that are effective for Latino students and English Learner students.

About UnidosUS



UnidosUS is a nonprofit, nonpartisan organization that serves as the nation's largest Hispanic civil rights and advocacy organization. Since 1968, UnidosUS has built a stronger America by creating opportunities for Latinos and breaking down barriers to expand economic and social progress for all. UnidosUS partners with an [Affiliate Network](#) of nearly 300 community-based organizations across the United States and Puerto Rico. For more information on UnidosUS, visit www.unidosus.org or follow us on [Facebook](#), [Instagram](#), [LinkedIn](#), [X](#), and [Threads](#).

Table of Contents

Executive Summary	1
Demographic Urgency and Achievement Trends	1
Principles of Quality Algebra Learning for English Learner and Latino Students	2
Results From the Scan	3
Implications and Recommendations	3
Introduction	4
English Learner and Latino Students in U.S. Schools	5
Student Outcomes: Differences in Trends	11
English Learner Student Outcomes	11
Latino Student Outcomes	12
Comparison of English Learner and Latino Students' NAEP Trends	13
Principles of Quality Algebra Learning for English Learner and Latino students	14
Principle 1. Rigorous Learning of Mathematical Ideas and Practices	15
Principle 2. Purposeful Focus on Language for Learning Mathematics	16
Principle 3. Participation That Builds From Belonging to Agency	16
Principle 4. Pedagogy That Affirms Identity and Builds Futures	17
Principle 5. Critical Awareness About and With Mathematics	18
Understanding Education Systems Ecologically	20
Teacher Pedagogy and Practice	21
Instructional Materials	22
Professional Learning	24
Results: State Initiatives and Investments	26
Siloing of Documents and Departments	26
More Focus on Mathematics and Language Compared to Student Agency, Identity, and Criticality	27
Invisibility and Conflation of Latino Students With English Learner Students	28
Implications and Recommendations	29
Reflect on Multilayered Alignment With Principles	29
Build on Successes in Integrating Mathematics and Language	29



Learn in Networks to Share Successes	30
References	31
Appendix: Document Selection and Analyses	37
Data Sources: SEA Policy Documents	37
Analyses	37



Executive Summary

This study contextualizes demographic shifts and achievement trends of students classified as English Learners and Latino students, highlighting the urgency of supporting quality algebra learning for these students. The focus is on 13 state education agencies (SEAs) that serve high populations of English Learner students and have high rates of growth in English Learner or Latino enrollment. The report uses research-based principles of quality algebra learning as a lens for reviewing these SEAs' initiatives in mathematics instructional materials and professional learning (see the Appendix for more detail on how the scan was conducted). The scan of SEA initiatives reveals structural challenges from the siloing of initiatives; greater emphasis on just two of the principles of quality algebra learning (mathematics rigor and language focus) with minimal or no attention to the principles that relate to developing learner agency, identity, and critical perspectives; and a lack of focus on Latino students or a conflation of their needs with those of English Learner students. The report provides recommendations for SEAs to reflect on the alignment and coherence of their initiatives and investments to ensure that English Learner and Latino students benefit and to build on strengths and learn in community with other SEAs.

Demographic Urgency and Achievement Trends

The study focuses on 13 SEAs selected to represent the complexity and heterogeneity of changes in English Learner and Latino populations. The 13 focus SEAs are those with the top five largest English Learner enrollments and/or the top five largest increases in concentration of English Learner and/or Latino students over the course of a decade (Table 1).



Table 1. Focal State Education Agencies Based on English Learner and Latino Populations

Top five English Learner enrollments	Top five growth in percentage English Learner	Top five growth in percentage Latino
- California - Texas - Florida - New York - Illinois	- Rhode Island - District of Columbia - Maryland - Delaware - Massachusetts	- Hawai'i - New Jersey - Connecticut - Maryland - Massachusetts

Note. [Digest of Education Statistics, 2022, Table 204.20](#) and [Digest of Education Statistics, 2023, Table 203.70](#).

Maryland and Massachusetts are in the top five of both categories of percentage point increase in concentration of English Learner and Latino students.

The overall national trend is of declining mathematics achievement at 8th grade over the past decade on the National Assessment of Educational Progress (NAEP) (National Assessment Governing Board, n.d.). This trend held for both English Learner students and Latino students overall, with a few notable exceptions. The District of Columbia and Hawai'i improved compared to the national average in terms of English Learner achievement. English Learner outcomes in Maryland, Massachusetts, and California declined more than the national average. Latino student outcomes in Maryland also declined more than the national average. Given the rapid increase in populations of English Learner and Latino students, further investigation will need to examine the extent to which these trends are driven by the changing demographic characteristics of students who fall into the broad and diverse categories of English Learner and Latino students.

Principles of Quality Algebra Learning for English Learner and Latino Students

A clear vision of quality learning in algebra is guided by five principles that synthesize best practice for English Learner students (e.g., Erath et al., 2021; Office of English Language Acquisition [OELA], 2021; Walqui et al., 2025) with insights from the body of work known as “culturally relevant and sustaining education” (e.g., Gutstein, 2003; Paris & Alim, 2014):

- rigorous learning of mathematical ideas and practices
- purposeful focus on language for learning mathematics
- participation that builds from belonging to agency
- pedagogy that affirms identity and builds futures
- critical awareness about and with mathematics

These principles are operationalized through indicators of students' learning experiences, teacher pedagogy and practice, and instructional materials.

Results From the Scan

The following overarching findings resulted from the scan of the 13 focal SEAs:

- **siloeing of documents and departments** related to English Learner students and mathematics. Both the structural organization of SEAs and the publication of documents and frameworks reflected how the needs of English Learner students were separated from many of the broader initiatives around mathematics. While some states have intentionally invested in aligning initiatives toward greater coherence, more work needs to be done to ensure alignment.
- **more focus on mathematics and language compared to learner agency, identity, and criticality.** While evidence of explicit alignment was uneven across the focal SEAs, the focus on mathematics and language-rich learning was generally stronger than the focus on the other three principles, those relating to agency, identity, and criticality.
- **invisibility of Latino students and their conflation with English Learner students.** It was often difficult to identify SEA initiatives that explicitly addressed the strengths and needs of Latino students. Latino students were often “invisible” in the sense of not being directly addressed by state initiatives other than being a reporting category for state tests. In other cases, the needs of Latino students were conflated with the needs of English Learner students in terms of language supports and assumption of their academic literacy in Spanish.

Implications and Recommendations

- **Reflect on multilayered alignment with principles.** SEA teams should engage in collaborative reflection on the extent to which their initiatives reflect strong evidence of the principles of quality algebra learning. Such collective reflection can help target investments and future work for building capacity strategically and systematically.
- **Build on successes in integrating mathematics and language.** An area of work to focus on next is integrating mathematics and language initiatives. Taking lessons learned about the conditions and processes that support that integration can serve as a foundation for SEAs to address the more challenging elements of agency, identity, and criticality.
- **Learn in networks to share successes.** SEA teams can benefit from learning from other states about what conditions and processes can best build capacity for supporting quality algebra learning.



Introduction

This study contextualizes demographic shifts and achievement trends of students classified as English Learners and Latino students, highlighting the urgency of supporting quality algebra learning for these students. The focus is on 13 state education agencies (SEAs) that serve high populations of English Learner students and have high rates of growth in English Learner or Latino enrollment. The report uses research-based principles of quality algebra learning as a lens for reviewing these SEAs' initiatives in mathematics instructional materials and professional learning. The scan of SEA initiatives reveals structural challenges from the siloing of initiatives; greater emphasis on just two of the principles of quality algebra learning (mathematics rigor and language focus) with minimal or no attention to the principles that relate to developing learner agency, identity, and critical perspectives; and a lack of focus on Latino students or a conflation of their needs with those of English Learner students. The report provides recommendations for SEAs to reflect on the alignment and coherence of their initiatives and investments to ensure that English Learner and Latino students benefit and to build on strengths and learn in community with other SEAs.



English Learner and Latino Students in U.S. Schools

Improving mathematics learning opportunities for secondary English Learner and Latino students has become increasingly urgent in the context of rapid demographic shifts and persistent differences in mathematics achievement. Across the United States, the population of English Learner students in grades 6–12 has grown substantially along with increases in Latino student populations in many states (Irwin et al., 2024). Latino students are diverse in English proficiency (including students who are not classified as English Learners), citizenship or documentation status, migration and schooling histories, race and ethnicity, and the sociopolitical contexts that shape their opportunities and experiences. Students categorized as English Learners are also a highly diverse group—spanning many racial, ethnic, national-origin, and linguistic backgrounds, as well as a wide range of English proficiency levels, prior schooling experiences, and instructional program placements.

The country’s demographic and student achievement shifts present both an opportunity and a challenge for education systems because instructional materials, educator preparation, and systemic capacity have not kept pace with the linguistic, cultural, and experiential diversity of the students they serve. Attending to this diversity—rather than treating Latino students or English Learner students as a single group—is essential for designing equitable mathematics pathways and supports. Within this context, algebra represents a critical juncture because success in algebra is closely tied to broader trajectories of academic achievement and access to college, career, and civic participation (de Araujo & Smith, 2022).

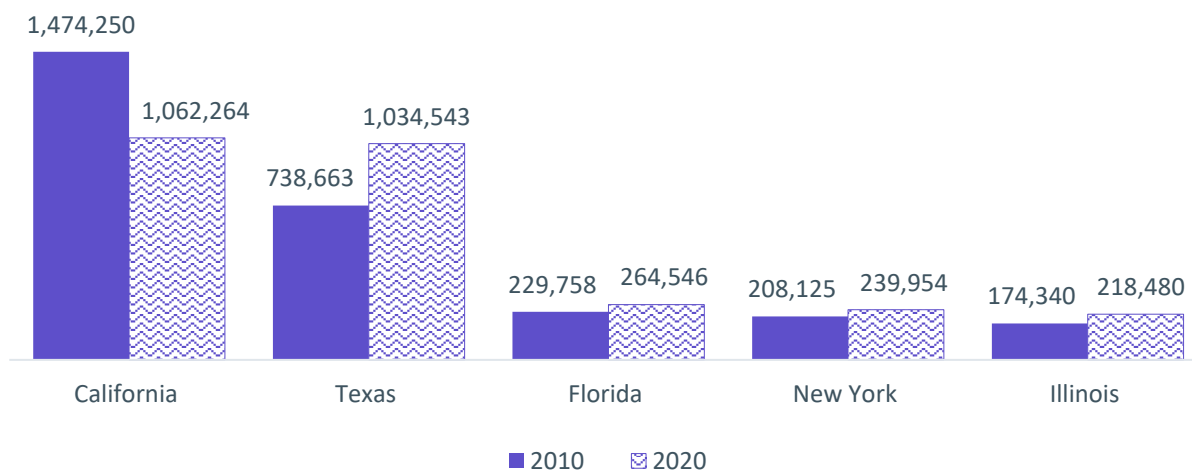
The need to strengthen education systems for English Learner and Latino students is underscored by rapid demographic growth. Between 2011 and 2021, enrollment of English Learner students in grades 6–12 across the United States increased by more than 50 percent to



over 2.2 million students, while the K–5 English Learner population declined slightly (Irwin et al., 2024).

Five states—California, Texas, Florida, Illinois, and New York—have historically had the largest total English Learner enrollment (Figure 1). Patterns of change across these states, however, have varied considerably. California’s English Learner enrollment has decreased by 28 percent to just over one million students. In contrast, Texas’s English Learner enrollment has increased by 40 percent and, at over one million students, is close to overtaking California in total enrollment. Florida, New York, and Illinois have experienced more modest increases in English Learner enrollment, ranging from 15 percent to 25 percent over the same period.

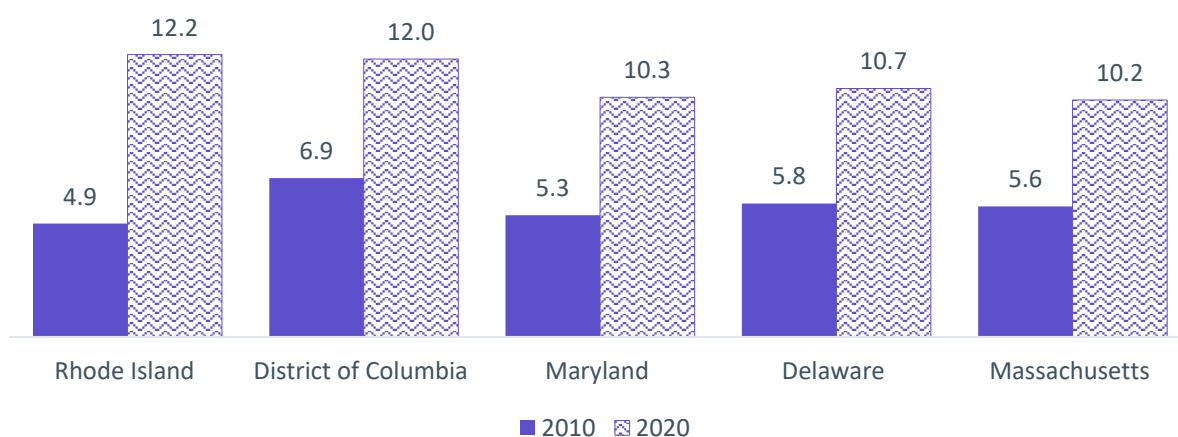
Figure 1. Top Five SEAs With Largest Total English Learner Enrollment, 2010–20



Note. [Digest of Education Statistics, 2022, Table 204.20.](#)

Many smaller SEAs have experienced large increases in the concentration of English Learner students, with these increases ranging from 4.6 to 7.3 percentage points (Figure 2). Rhode Island more than doubled its English Learner population from 7,655 to 17,289 between 2010 and 2020, corresponding to an increase in concentration from 4.9 percent to 12.2 percent of all students. Two other small SEAs—the District of Columbia and Delaware—increased total English Learner enrollment by 78 percent and 113 percent, respectively. Two medium SEAs began the decade with roughly 50,000 English Learner students and ended the decade with closer to 100,000 English Learner students by 2021. Specifically, Maryland (45,500) and Massachusetts (54,988) grew by 95 percent and 67 percent, respectively, to reach 88,834 English Learner students in Maryland and 92,076 in Massachusetts in 2021.

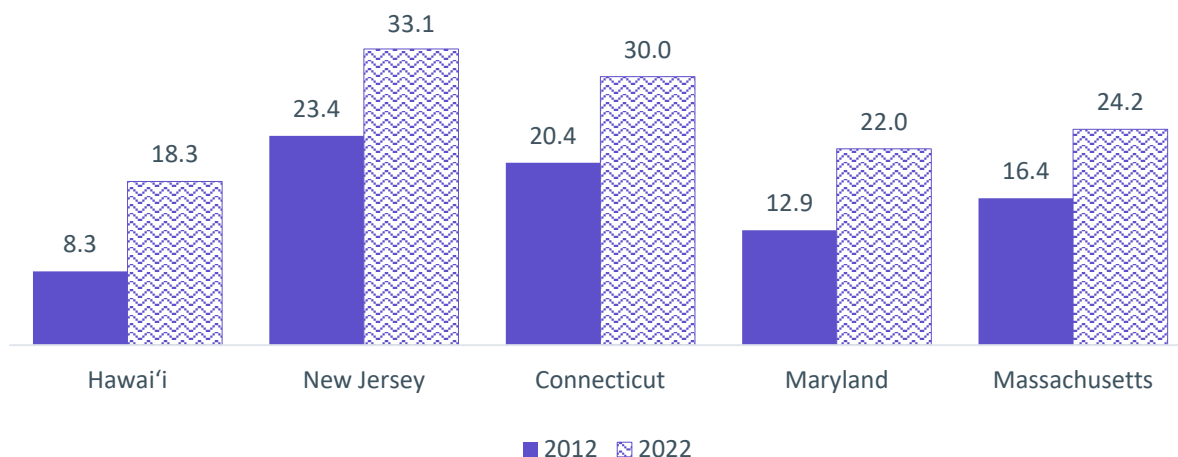
Figure 2. Top Five SEAs With Greatest Increases in Percentage English Learner, 2010–20



Note. [Digest of Education Statistics, 2022, Table 204.20.](#)

An overlapping set of states has seen increases in the concentration of K–12 Latino students, ranging from a 7.8 percentage point increase in Massachusetts to a 10.0 percentage point increase in Hawai‘i (Figure 3). In the most recent year for which data are available, Latino students make up nearly one quarter of the school population in Massachusetts (24.2%) and nearly one third in Connecticut (30.0%) and New Jersey (33.1%). While many of these states are in the Northeast and Mid-Atlantic regions, Hawai‘i is also a unique case within the broader group of 13 focal SEAs.

Figure 3. Top Five SEAs With Greatest Increases in Percentage Latino, 2012–22

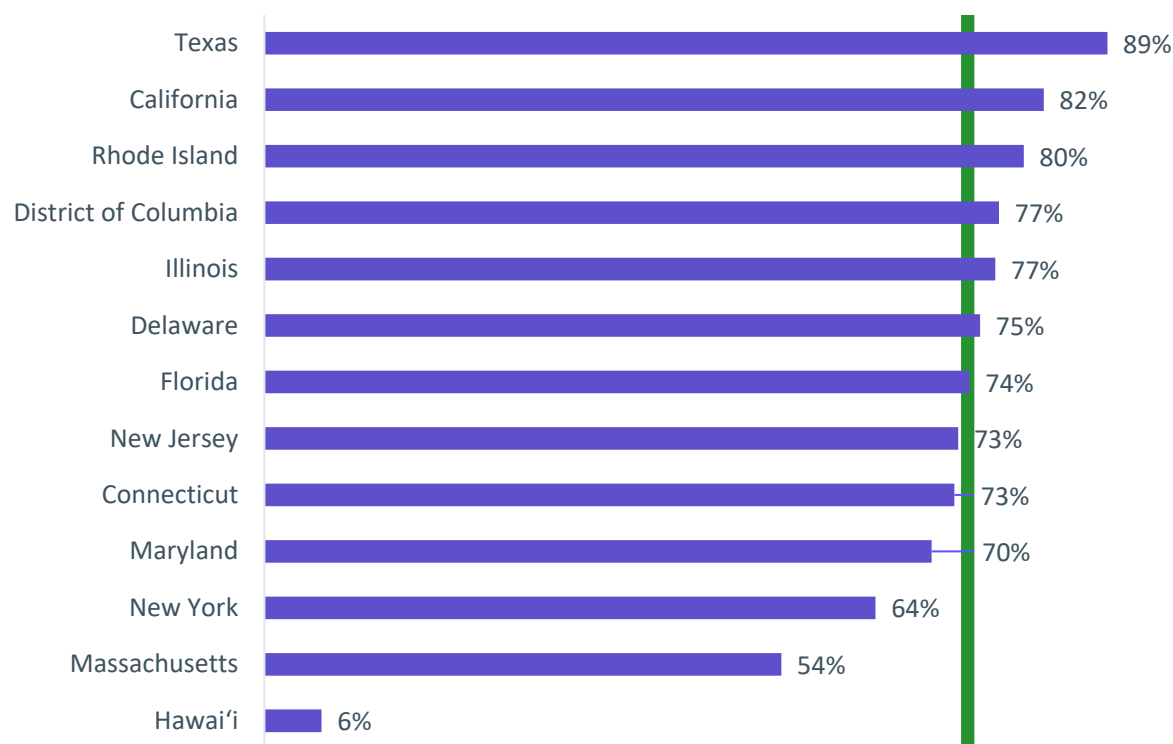


Note. [Digest of Education Statistics, 2023, Table 203.70.](#)

These demographic changes raise important policy and program considerations because the teacher workforce and pedagogical practices often lag behind shifts in the student population by at least a generation. As a result, it is critical for SEAs to invest in high-quality learning opportunities that effectively serve English Learner students and Latino students.

Looking at the connections between English Learner status and Latino reveals a great deal of variation across the focal 13 SEAs (OELA, 2025). About half of the focal 13 SEAs are below the national average in terms of percentage of English Learner students speaking Spanish (74%), with some states known for linguistic diversity having lower percentages, including New York (64%), Massachusetts (54%), and Hawai'i (6%) (Figure 4).

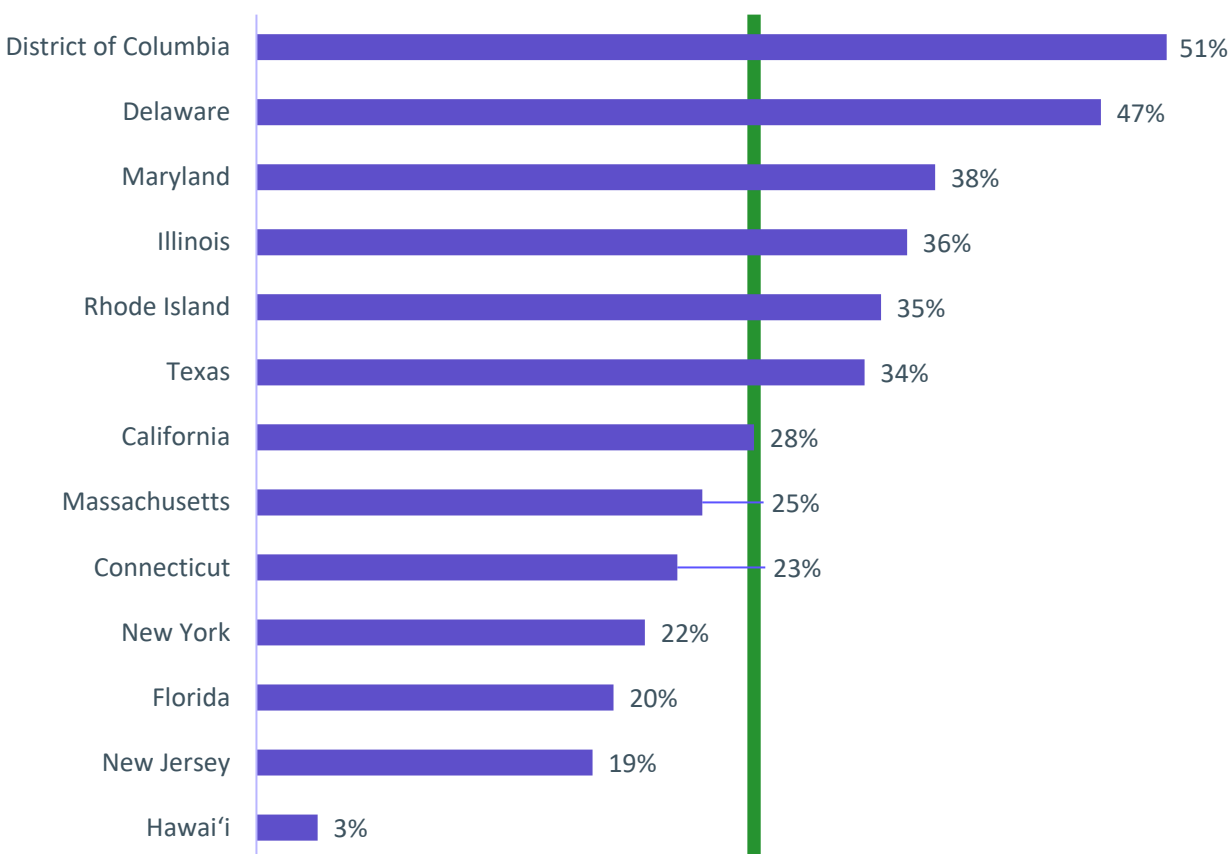
Figure 4. Percentage of English Learner Students Who Speak Spanish



Note. [National Clearinghouse for English Language Acquisition, Title III State Profiles.](#)

Nationally, 27 percent of Latino students in K–12 education are also classified as English Learners, while the median percentage was 28 percent among the 13 focal SEAs, represented by California (Figure 5). In all focal SEAs except for the District of Columbia, fewer than half of Latino students are English Learner students.

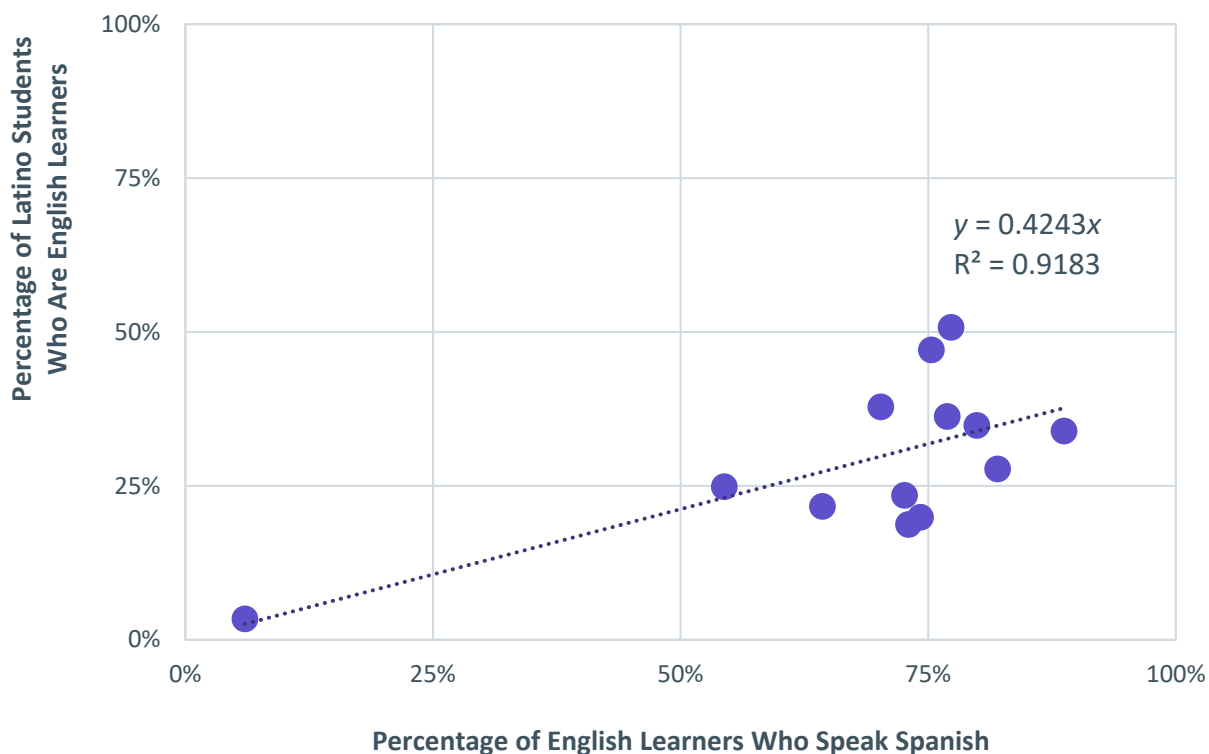
Figure 5. Percentage of Latino Students Who Are English Learners



Note. [National Clearinghouse for English Language Acquisition, Title III State Profiles.](#)

Finally, from cross-tabulating across the 13 focal SEAs, a general pattern of correlation emerges between percentage of English Learner students who speak Spanish and percentage of Latino students who are English Learners (Figure 6). There is still a great deal of variability across the 13 SEAs. For example, the District of Columbia has a concentration of Spanish-speaking English Learner students very close to the national and sample average (77%) and has a higher than average percentage of Latino students who are English Learners (51%), the highest plotted point in Figure 6. Hawai'i has few Spanish-speaking English Learner students (6%) and few Latino students who are English Learners (3%), as represented in the lower left of the graph. Texas has the largest percentage of English Learner students who speak Spanish (89%) but has a percentage of Latino students who are English Learners (34%) that is closer to the median, as represented by the point furthest on the right-hand side of the graph.

Figure 6. Correlation Between Percentage of English Learner Students Who Speak Spanish and Percentage of Latino Students Who Are English Learners, 13 SEAs



Note. [National Clearinghouse for English Language Acquisition, Title III State Profiles.](#)



Student Outcomes: Differences in Trends

This section presents decade-long trends in 8th grade mathematics results from the National Assessment of Educational Progress (NAEP) for English Learner and Latino students in this study's 13 focal SEAs, based on data from [NAEP Data Explorer](#).¹ Below are selected highlights.

English Learner Student Outcomes

The overall national trend in English Learner Students' 8th grade Mathematics NAEP scaled scores is one of gradual decline, from 246 to 238 over the period of 2013 to 2024.

For each of the 13 focal SEAs, English Learner outcomes were compared to the overall national trend and to other SEAs. There were five SEAs for which English Learner outcomes differed noticeably from the national trend, which can be seen by crossing the green line representing the national average in Figure 7.

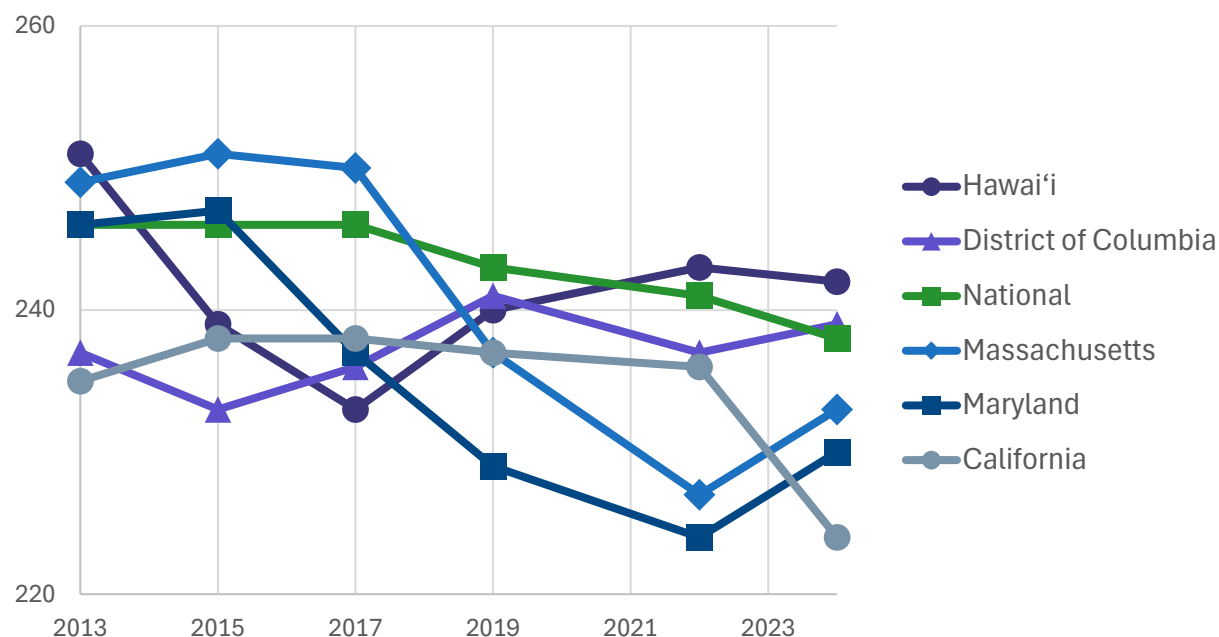
In two SEAs, English Learner students' mathematics outcomes improved more than the national average. Hawai'i had an 11-point increase for English Learner students from 2017 to 2024, first exceeding the national average in 2022. The District of Columbia, on the other hand, has mostly seen increases in English Learner students' mathematics outcomes since 2015, exceeding the national average for English Learner students in 2024.

Three SEAs had declining trends for English Learner students' mathematics achievement according to two different patterns. California had a large decline of 12 points between 2022 and 2024. California English Learner students have, however, consistently scored lower than the national average across the entire 2013–24 time period. By contrast, for Maryland and Massachusetts, English Learner students' mathematics scale scores have been lower than the national average since 2017 and 2019, respectively. The declines in Maryland and Massachusetts are of particular interest because they have had both rapid English Learner population growth and rapid Latino population growth.

¹ Data and analyses in this section were collected and analyzed using this tool.



Figure 7. English Learner Students' 8th Grade Mathematics NAEP Scaled Score Trends in Selected States, 2013–24.



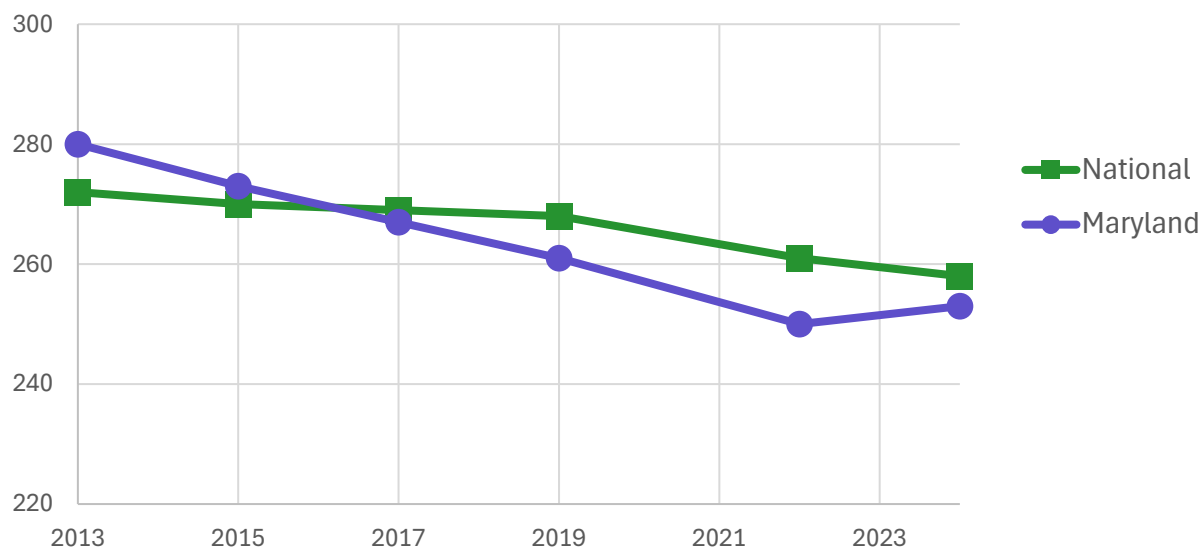
Note. [NAEP Data Explorer](#).

Latino Student Outcomes

The overall national trend in 8th grade Latino students' mathematics NAEP scaled scores is moderate decline, from 272 to 258 over the period of 2013 to 2024.

Within the 13 focal SEAs, Latino student outcomes did not change much in regard to the national average, with the notable exception of Maryland. There was a decrease of 27 points for Maryland Latino students between 2013 and 2024. While Maryland was above the national average in 2013 in terms of Latino students' average scaled scores, 8th grade Latino students in Maryland since 2017 have scored lower than the national average in NAEP mathematics (Figure 8).

Figure 8. Latino Students' 8th Grade Mathematics NAEP Scaled Score Trends in Maryland and the Nation, 2013–24



Note. [NAEP Data Explorer](#).

Comparison of English Learner and Latino Students' NAEP Trends

These trends underscore that Latino students and English Learner students are not the same group. Although both groups decreased in this time period by a similar number of NAEP scale score points (8 points for English Learner students and 14 points for Latino students), the ranges of these declines do not at all overlap for Latino students (272 to 258) and English Learner students (246 to 238).

The overall pattern among the 13 SEAs of a declining trend among Latino students but mixed trends for English Learner students will need to be further explored in terms of the extent to which these are related to state initiatives and will need to be compared to demographic changes in the composition of these groups over this decade-long period. Maryland is of particular interest because it has shown marked declines that are larger than those of the national average among both English Learner and Latino students.

Principles of Quality Algebra Learning for English Learner and Latino students

Research is reaching an emerging consensus on quality mathematics learning for English Learner and Latino students. This growing body of research emphasizes maintaining academic rigor while offering appropriate supports, engaging students in meaningful participation, and attending purposefully to language development (de Araujo et al., 2018; Hamburger & Chu, 2025; National Academies of Sciences, Engineering, and Medicine [NASEM], 2017, 2018; OELA, 2021; Walqui et al., 2025). In parallel, other scholarship, such as research on culturally responsive and sustaining education (CRSE), underscores the importance of affirming students' identities, fostering agency and belonging, and connecting learning to students' experiences in real-world contexts (Hernandez et al., 2022; Neri et al., 2023; Warner, 2025). While these traditions are ultimately compatible and directed toward the same aims of quality learning, they are often taken up separately in policy and practice.

A synthesis of this research on English Learner and Latino students' mathematics learning informed this report's scan of state outcomes and initiatives. Specifically, the scan considered the following research-based principles:

1. ***Rigorous learning of mathematical ideas and practices*** emphasizes how students make connections with ideas that enable deep conceptual understanding and practices.
2. ***Purposeful focus on language for learning mathematics*** highlights the importance of understanding how language works and of offering students options for using language in learning mathematics.



3. **Participation that builds from belonging to agency** focuses on positioning students as capable contributors so that over time they develop greater autonomy and agency.
4. **Pedagogy that affirms identity and builds futures** invites students' multiple identities and lived experiences into classroom learning to create new possible futures.
5. **Critical awareness about and with mathematics** supports students in applying mathematics for understanding real-world issues and developing critical consciousness.

Notably, these principles begin from the student perspective, framing what quality algebra learning would look like, sound like, and feel like from their perspectives and experiences. The principles go on to consider the conditions—in terms of teacher pedagogy and practice and instructional materials—necessary for quality algebra learning to occur.

Principle 1. Rigorous Learning of Mathematical Ideas and Practices

Deep conceptual understanding of mathematics is cognitively demanding (Stein et al., 2009) and requires connections across procedures, representations, and scenarios, with students consistently engaged in making and sharing meaning (Wilson & Smith, 2022). While mathematical procedures are important for developing fluency, being able to carry out an algorithm does not constitute conceptual understanding. Given the lived experiences that all students, including English Learner and Latino students, bring to the mathematics classroom, learning should connect to real-world contexts that center students' communities, languages, and everyday realities (Roberts et al., 2022). These connections can position real-world experiences not only as sources of meaningful problems to investigate but also as foundations for analogies and representations that draw on students' funds of knowledge and that support the development of mathematical ideas (Chu & Rubel, 2013).

Further, multiple standards and frameworks have emphasized the practices (Opfer et al., 2016) or processes (National Council of Teachers of Mathematics [NCTM], 2000) that are essential to the creation of new mathematics. Examples of key practices include making sense of story problems and persevering in solving them, as well as choosing and using appropriate tools to solve a problem. While these practices are central to the development of adaptive expertise, it is especially critical for English Learner students that they are also offered meaningful opportunities to develop the language required to engage in these practices (OELA, 2021).

More recently, researchers have explored crosscutting concepts in mathematics that may tie together subdomains such as algebra, geometry, and statistics (NCTM, 2025). For example, the crosscutting concept of equivalence and transformation can be a lens through which to connect solving equations and understanding similarity and dilation in geometry and data sets with common measures of center (Chu & Hamburger, 2022; Chu & Jackson, 2025). With respect to algebra learning, crosscutting concepts have the potential to deepen learning by drawing



connections to students' prior learning in geometry and statistics while foreshadowing ideas they will explore in more advanced and abstract mathematics.

Principle 2. Purposeful Focus on Language for Learning Mathematics

Language is particularly salient for students designated in accordance with federal law as English Learners. While historically this bureaucratic label has been deficit oriented (e.g., “Limited English Proficient”), concerted efforts in the 21st century have emphasized the immense promise of students to become multilingual and multiliterate in an increasingly intercultural future (García et al., 2013). It is counterproductive to view English language proficiency as a prerequisite for learning mathematics; instead, all students need rich opportunities to use and explore language along with mathematical ideas and practices.

Language-rich learning opportunities combine discourse with purposeful attention to how language works, with the goal of increasing student autonomy over time (Erath et al., 2021). This approach means that different modalities of using language, including speaking, listening, reading, and writing, are integrated into meaningful mathematical activities (OELA, 2021). In mathematics, there are specialized ways in which symbol systems are used to construe meaning and generate new ideas and understanding (Lemke, 2003). Specialized genres, such as proof, are also characteristic of mathematical activity, and they require students to develop an explicit understanding of the “how” and “why” of the features of that genre (O'Halloran, 2005). Mathematical proof, for instance, is more deductive than other argumentative genres.

Well-designed language learning opportunities also offer meaningful opportunities for students' language to grow as their conceptual understanding and engagement in mathematical practices become more sophisticated. Their use of language grows more extended, authoritative, and technical over time (Derewianka & Jones, 2023). That is, students' language becomes more extensive and deep as it more closely resembles the features of edited texts or rehearsed speeches that develop ideas in greater depth. Their voices become more authoritative and expert as they stipulate conditions, definitions, and ideas with a more deductive communicative structure (Chu et al., 2022). Their language also becomes more technical as they incorporate specialized vocabulary with narrow mathematical meanings to refer to and connect ideas precisely and elegantly (Chu & Evans, 2025).

Principle 3. Participation That Builds From Belonging to Agency

Participation in mathematics learning is foundational to developing understanding, yet for many English Learner and Latino students, opportunities to participate meaningfully have historically been constrained by deficit positioning, limited access to discourse, or narrow views of competence (de Araujo et al., 2018; NASEM, 2018). Learning environments must therefore be intentionally designed to cultivate a sense of belonging as a key condition for active and



sustained participation. Belonging is fostered when students are recognized as legitimate contributors, when their ideas are taken seriously, and when classroom norms support risk-taking and collaboration (Neri et al., 2023; Walqui & van Lier, 2010). Such belonging does not refer to how individual students feel; rather, it is a condition of learning environments that is critical for all students, and, given historical patterns, particularly important to address for English Learner and Latino students (Harris-Thomas et al., 2026; Walton & Cohen, 2011).

Participation that is productive is characterized by quality interactions between peers, which are observable through student talk and discourse (Chu & Hamburger, 2019). First, talk is sustained when individual students have opportunities to elaborate, in depth and at breadth, about their mathematical ideas and connections. Second, interactions between students are reciprocal when they build on, refine, challenge, and negotiate each other's ideas toward shared understanding. Quality interactions are a key vehicle for mathematics learning by offering students opportunities to make connections and engage in mathematical practices with their peers. Within such environments, students can engage in sustained talk, reciprocal interactions, and shared problem-solving that position them as sense-makers rather than passive recipients of knowledge (Erath et al., 2021; OELA, 2021).

As participation deepens over time, it should support the development of student agency—students' capacity to take initiative, make decisions, and shape activity (Gutiérrez, 2012). This growing agency includes opportunities for students to ask questions, propose strategies, critique reasoning, and influence the direction of inquiry, which are central to ambitious mathematics learning (NCTM, 2000; Opfer et al., 2016). Structured supports, such as assigned roles, discourse routines, and collaborative tasks, can broaden participation in ways that invite students to take greater autonomy over time (Walqui & van Lier, 2010). For English Learner students in particular, participation and language development are mutually reinforcing—engaging in mathematical discourse provides meaningful contexts for language use, while expanding linguistic repertoires enables forms of participation that are more complex (Erath et al., 2021; OELA, 2021). Ultimately, classrooms that build from belonging to agency support students not only in engaging with mathematics but also in seeing themselves as capable and authoritative doers of mathematics.

Principle 4. Pedagogy That Affirms Identity and Builds Futures

Mathematics learning is deeply connected to students' identities, yet traditional approaches have often marginalized or ignored the cultural and linguistic resources of students who are English Learners and those who are Latino (de Araujo et al., 2018; Neri et al., 2023). Sustaining cultural and linguistic identities requires moving beyond surface-level relevance toward learning experiences that affirm, extend, and draw upon students' lived experiences, community knowledge, and ways of communicating (Hernandez et. al., 2022; Paris & Alim, 2017; Roberts et al., 2022). This includes recognizing multilingualism as an asset and supporting



flexible language practices that allow students to use their full linguistic repertoires to make sense of mathematical ideas (García et al., 2013; Walqui et al., 2025). When students' identities are reflected and valued in mathematics learning, they are more likely to experience a sense of belonging and to engage deeply with content (Neri et al., 2023; Warner, 2025).

In addition, this principle involves supporting students in developing positive mathematical identities—seeing themselves as competent, valued, and capable participants in mathematics (Gutiérrez, 2012). This includes countering deficit narratives and expanding representations of who does mathematics and how it is done (NASEM, 2017). Learning opportunities can connect mathematics to students' communities and experiences not only as contexts for problems but also as sources of insight, reasoning, and innovation (Chu & Rubel, 2013; Roberts et al., 2022). Over time, such approaches enable students to imagine futures for themselves that include mathematics, whether in academic, professional, or civic domains (Cunningham et al., 2024; Neri et al., 2023). By centering and sustaining cultural and linguistic identities, mathematics learning becomes a space in which students' full selves are recognized as integral to disciplinary engagement and success.

Principle 5. Critical Awareness About and With Mathematics

Critical awareness about and with mathematics extends beyond ensuring that students have access to rigorous content or opportunities to participate in classroom discourse. It emphasizes students' capacity to use mathematics with purpose—to analyze, interpret, and make sense of real-world phenomena—while also developing a critical stance about mathematics itself, including its representations, assumptions, and uses. Within this principle, mathematics is not positioned as neutral or purely abstract; rather, it is understood as a human practice embedded within social, cultural, and historical contexts (Neri et al., 2023; Warner, 2025). This dual framing highlights both the use of mathematics as a tool for understanding the world and the need to interrogate how mathematical knowledge is constructed and applied, particularly in ways that can reveal or obscure patterns of power and inequality (Gutiérrez, 2012; Neri et al., 2023).

This principle aligns with sociocultural perspectives on learning, which position knowledge as co-constructed through interaction and grounded in lived experiences. When students draw on their everyday knowledge, linguistic resources, and community contexts, they are better able to engage in meaningful sensemaking that connects mathematical reasoning to authentic issues (Neri et al., 2023; Qin et al., 2025; Walqui & van Lier, 2010; Warner, 2025). Developing critical awareness about and with mathematics therefore involves opportunities to interpret and question data, examine how representations shape understanding, and consider how mathematical tools can be used to analyze complex social contexts. Such engagement repositions students as critical sensemakers who evaluate evidence, draw conclusions, and apply mathematical reasoning to inform decisions rather than simply executing procedures (Rubel & Chu, 2012).



At the same time, research suggests that opportunities to develop critical awareness about and with mathematics remain limited in typical mathematics instruction. Classroom practices often emphasize procedural fluency and decontextualized problem-solving, with limited attention to examining the broader implications of mathematical work or the social contexts in which it is embedded (Erath et al., 2021). Even in environments that prioritize discourse and participation, explicit attention to interrogating data, analyzing inequities, or critiquing representations is not consistently integrated into mathematical learning experiences. As a result, this principle represents both an extension and a deepening of current approaches to mathematics education. It calls for the intentional design of tasks, discourse, and systems that support students in using mathematics to understand the world while also developing awareness of how mathematics itself operates within systems of meaning and power.

Table 2 summarizes how the five principles of quality algebra learning can be observed and gauged through students' learning experiences.

Table 2. Principles of Quality Algebra Learning From the Perspective of Students

Principle	Quality algebra learning occurs when students ...
Rigorous learning	• Explore connections between procedures, representations, and situations. • Engage in mathematical practices that reflect higher order thinking. • Connect subdomains of mathematics with crosscutting concepts.
Purposeful focus on language	• Develop explicit understanding about how language works. • Make choices with and about language to make and share meaning. • Grow by using language in ways more extensive, deep, expert, and technical.
Participation, belonging, agency	• Contribute legitimately to mathematical activity. • Engage in sustained talk and reciprocal interactions about mathematics. • Take increasing initiative that reflects growing agency over time.
Pedagogy that affirms identity	• Draw upon cultural, community, and lived experiences to explore mathematics. • Employ their full linguistic repertoires to make and share mathematical meaning. • Develop identities as competent, valued participants in learning and making mathematics.
Critical awareness about and with mathematics	• Use mathematics as a tool to examine social or community issues. • Interpret data and data representations to critique assumptions, bias, or limitations. • Make arguments that use evidence, draw conclusions, or advocate for solutions.



Understanding Education Systems Ecologically

This study treats classroom learning—and its quality from the student perspective—as the core focus or purpose of education systems. But most SEAs do not directly work with students in the classroom, with notable exceptions such as the District of Columbia and Hawai‘i. The complex ways education systems are layered and interconnected with multiple components (WestEd, 2025) are best understood with an ecological approach (van Lier, 2004). From an ecological perspective, what matters are the interconnections between different elements of education systems. These connections are dynamic and bidirectional, reflecting how education systems are not simply hierarchical or leveled. An ecological approach supports attention to alignment and coherence (Instruction Partners, n.d.; Walrond & Romer, 2021). With new instructional initiatives, scale is not simply a matter of the number of teachers involved; it also involves depth and adaptation (Coburn, 2003; Cohen et al., 2018). At the district level, sustained political will—particularly continued senior district leadership—is essential to ensure that individual schools are not the primary drivers of instructional improvement (Gallagher et al., 2026).

Improving learning opportunities in the mathematics classroom for English Learner and Latino students therefore also requires attention to

- teacher pedagogy and practice,
- instructional materials, and
- professional learning.

Each of these elements can be approached through the principles for quality algebra learning. In practice, these elements are closely interconnected: Instructional materials are implemented



through classroom instruction and learning, and teachers' pedagogy and practice are shaped by their professional learning. Considering all three dimensions ecologically—and attending to their overlaps, synergies, and potential disconnects—enables evaluation of the alignment and coherence of systems-change efforts and the extent to which they address the needs and futures of English Learner and Latino students.

This study recognizes that most SEAs do not directly change students' learning experiences; instead, they use policy, guidance, technical assistance, and investment to influence system elements that ultimately improve student learning.

The following sections on the three critical elements of education systems unpack some of the challenges that SEAs have to overcome to fully serve students who are English Learners and/or Latino students. Addressing these challenges can change student learning experiences in ways that are aligned with the principles. These changes may be observable in teacher actions, features of instructional materials, and characteristics of professional learning.

Teacher Pedagogy and Practice

While teacher practice most directly influences student learning opportunities, other closely connected domains of expertise such as knowledge and beliefs shape practice (Chu & Bañuelos, 2015; Shulman & Shulman, 2004; Walqui, 2008). Beyond having pedagogical content knowledge in mathematics (Hill et al., 2008), teachers must also possess knowledge of students' lived experiences, cultural and linguistic practices, and aspirations for the future. This deep knowledge of where students are coming from and where they are going must also be coupled with a belief that students have immense promise to contribute to a future they are part of creating (OELA, 2021).

Indeed, how teachers view English Learner students in particular may be critically important, whether through a past-focused, deficit-driven lens or with a more asset-based and future-oriented perspective (Walqui et al., 2025). Beliefs and vision around language and language development are particularly challenging because mathematics teachers in particular may not deeply understand language development and linguistics within a social context. In a recent nationally representative survey, half of mathematics teachers reported that they felt unprepared to fully support Multilingual Learners in learning content, with only 13 percent reporting that they felt fully prepared (Lee et al., 2025).

All of these elements (teacher practice, knowledge, and beliefs) combine to form pedagogy, the theory that undergirds and drives daily instructional practice. For Latino students in particular, there is a critical need for a future-oriented approach that is most directly addressed by the principles for sustaining cultural and linguistic identities (Cunningham et al., 2024). While there have been numerous examples of CRSE with Latino students in a variety of contexts (e.g., Gutiérrez, 2002; Gutstein, 2003), the persistent mismatch between educators and their Latino



students in terms of cultural, ethnic, and linguistic backgrounds continues to pose a challenge to realizing the full promise of CRSE.

Table 3 outlines how teacher pedagogy and practice can support quality algebra learning.

Table 3. Principles of Quality Algebra Learning for Teacher Pedagogy and Practice

Principle	Teacher pedagogy and practice support quality algebra learning when educators ...
Rigorous learning	• Design opportunities to connect procedures, representations, and situations. • Support students in engaging in practices that reflect higher order thinking. • Invite and support students to apply crosscutting concepts.
Purposeful focus on language	• Offer opportunities for students to explicitly understand how language works. • Offer students explicit choices of how to use language and why to choose. • Nurture growth in student language toward more extensive, deep, expert, and technical language use.
Participation, belonging, agency	• Create opportunities for students to contribute legitimately. • Engage students in sustained talk and reciprocal interactions about mathematics. • Offer students increasing initiative to engage their growing agency over time.
Pedagogy that affirms identity	• Invite students to share their cultural, community, and lived experiences. • Create opportunities for students to employ their full linguistic repertoires. • Position students as competent, valued participants in learning and making mathematics.
Critical awareness about and with mathematics	• Identify social or community issues that students can apply mathematics to. • Create opportunities to Interpret data and critique assumptions, biases, or limitations. • Support students as they make arguments, use evidence, draw conclusions, or advocate for solutions.

Instructional Materials

Much attention has been paid to high-quality instructional materials (HQIM). An enduring challenge in mathematics is that many instructional materials still have a “delivery mechanism” approach (Choppin et al., 2022). Such instructional materials focus on the repetitive application of given procedures in instances when they are guaranteed to work rather than challenging



students to grapple with enticing problems and develop ideas and procedures that reflect adaptive expertise and deep conceptual understanding.

Algebra instructional materials often embed monolithic, deficit perspectives regarding the linguistic and conceptual abilities and needs of English Learner students in particular (de Araujo & Smith, 2022). Indeed, textbooks often preteach vocabulary and definitions, which can take away students’ ability to generalize and develop convincing abstract arguments and can be to the detriment of English Learner students in particular. Many of those standard textbook definitions may be either vague or verbose (Chu et al., 2022); giving either not enough information to form the basis for deductive reasoning or giving too much information detracts from students’ understanding the essence of a mathematical idea (Molina, 2012). Furthermore, instructional materials may contain conceptually challenging mathematics but not embed the necessary supports to foster full student participation in discourse and mathematical exploration, particularly for English Learner students. The design of individual activities may also have a limited focus on participation that bridges from belonging to agency (Chu & Hamburger, 2019). Mathematics teachers also report that they find that instructional materials typically do not address English Learner students as a top-five priority (16%), and teachers do not think that required instructional materials adequately address English Learner students in content and language (30%), with more than 80 percent of teachers reporting the need for improvements to how mathematics materials provide English Learner supports (Lee et al., 2025).

Given the national and commercial nature of most companies that produce instructional materials, the default cultural frame of reference of textbooks typically does not reflect the lived experiences of Latino students. From the perspective of CRSE in particular, most standard textbooks lack adequate attention to critical social and community issues (Gutstein, 2003). Some examples of curricula that address CRSE are emerging (Warner, 2025), as are guidance frameworks to evaluate the relationships between instructional materials and implementation (Cunningham et al., 2025).

Table 4 outlines the role of instructional materials in supporting quality algebra learning.

Table 4. Principles of Quality Algebra Learning as Enabled by Instructional Materials

Principle	Instructional materials support quality algebra learning when they ...
Rigorous learning	• Offer opportunities to connect procedures, representations, and situations. • Engage students in mathematical practices that reflect higher order thinking. • Connect subdomains of mathematics with crosscutting concepts.

Principle	Instructional materials support quality algebra learning when they ...
Purposeful focus on language	• Support students in developing explicit understanding about how language works. • Offer students choices with and about language to make and share meaning. • Create opportunities for students' language use to grow more extensive, deep, expert, and technical.
Participation, belonging, agency	• Foster belonging by inviting connections to students' ideas. • Offer structures to engage in sustained talk and reciprocal interactions about mathematics. • Develop students' growing agency and growing initiative over time.
Pedagogy that affirms identity	• Include examples reflecting students' cultural, community, and lived experiences. • Invite students to use full linguistic repertoires to make and share meaning. • Offer opportunities for students to develop identities as competent, valued participants.
Critical awareness about and with mathematics	• Include social or community issues for which mathematics can be an analytic tool. • Offer data and representations with a focus on critiquing assumptions. • Invite students to make arguments that use evidence, draw conclusions, or advocate for solutions.

Professional Learning

Professional learning is critical in bridging between instructional materials and teachers' pedagogy and practice. While features of effective professional learning, such as active adult learning and job-embeddedness, have been written into federal law (Darling-Hammond et al., 2017), the focus has been on content and not necessarily on connecting content to groups such as English Learner and Latino students. More recent meta-analyses about translating professional learning into deep, principled changes to practice for the benefit of students have called into question whether the features of most professional learning are sufficient without supports that more deeply connect teacher knowledge, reflection, and practice (Sims et al., 2025). A core tension may be whether the purpose of professional learning is to provide prescriptive solutions or insights that are more generally transposable to a variety of contexts and conditions (Kennedy, 2016).

When professional learning focuses on English Learner students, it tends to address ideas around language in a way that disconnects language from content-specific learning rather than connecting language with deep content learning (Bunch, 2013). Furthermore, when teachers



hold negative beliefs about English Learner students, their ability to benefit from professional learning and improve their practice is reduced (e.g., Mellom et al., 2018).

Challenges with integrating the mathematical goals for professional learning with the needs of Latino students and other groups of minoritized students have also been noted consistently (Cunningham et al., 2024; Rubel, 2017; Rubel & Chu, 2012). These include educators' resistance to the kinds of shifts that are involved in enacting CRSE (Neri et al., 2019). Of particular note is teachers' active resistance to—or more passive ignoring of—the more critical aspects of CRSE (Gutstein, 2003).

Results: State Initiatives and Investments

From scanning the 13 focal SEAs, the study identified three emerging themes regarding SEA initiatives for mathematics, English Learner students, and Latino students. First, approaches to mathematics and English Learner students were largely siloed or disjointed, as seen in the SEAs' relevant documents and departments. Second, while there was a stronger focus on principles of quality algebra learning that address rigor and language, the more student-oriented principles (agency, identity, and criticality) were much less prominent. Third, Latino students were often invisible (the scan tended not to find any initiatives that clearly serve Latino students), or they were conflated with English Learner students.

Siloing of Documents and Departments

Across states, SEA initiatives are typically organized within distinct policy domains; most notably, mathematics systems are typically separate from Multilingual Learner systems. The scan found that mathematics-related documents—including standards, instructional guidance, and instructional materials frameworks—tend to focus on content rigor, coherence, and alignment with grade-level expectations. In contrast, Multilingual Learner documents emphasize language development, program models, and service requirements.

This division is reflected not only in the structure of documents but also in the organizational arrangement of SEA departments, where mathematics, Multilingual Learner services, and accountability functions are frequently housed in separate departments or even divisions (e.g., curricula and instruction for mathematics and federal programs for departments focusing on Multilingual Learners). As a result, policies and initiatives targeting each domain are often developed and communicated independently.

Although some states include references to shared responsibility for English Learner students or collaboration across divisions, these connections are typically broad and aspirational rather



than operationalized within specific mathematics policies or tools. Integration between mathematics and Multilingual Learner supports is more commonly evident in programmatic materials (e.g., guidance on instructional models or professional learning) than in core mathematics frameworks such as content standards or instructional materials criteria.

The overall pattern suggests that SEAs tend to support mathematics learning for English Learner students through parallel but only partially integrated systems such that alignment across instructional materials, pedagogy, and professional learning is uneven. This fragmentation may limit the extent to which language development is systematically embedded within mathematics teaching and learning at the classroom level.

More Focus on Mathematics and Language Compared to Student Agency, Identity, and Criticality

From across the scan of 13 SEAs, documents demonstrate a consistent emphasis on rigorous mathematics instruction and language development, particularly in relation to providing access to grade-level content and supporting academic discourse. These priorities are reflected in standards-aligned frameworks; HQIM initiatives; and professional learning that emphasizes scaffolding, differentiation, and language-rich instructional practices.

While these efforts align strongly with the principles of quality algebra learning that relate to rigor and purposeful language use, there is comparatively less attention given to principles associated with student agency, identity, and critical engagement with mathematics. This finding is aligned with a recent national review of SEAs' conceptualization of and policies regarding CRSE (Comstock et al., 2026); this review found that a majority of states have either a weak conceptualization of or restrictive policies around CRSE.

References to student participation and engagement are present but are typically framed in terms of supporting comprehension or access to content rather than positioning students as active agents in mathematical inquiry or as contributors to knowledge construction. Opportunities for students to exercise decision-making, explore multiple solution pathways, or connect mathematics to their own experiences are not consistently articulated within state-level guidance.

Similarly, discussions of identity and culture are most often located within broader equity or culturally responsive frameworks rather than embedded directly in mathematics-specific documents. As a result, connections between students' cultural and community knowledge and mathematics learning remain underdeveloped within instructional guidance and materials policies.

Across the 13 focal SEAs, the least developed dimension is critical awareness about and with mathematics. There is minimal evidence of mathematics being framed as a tool for analyzing



social, economic, or community issues or for critiquing quantitative representations and inequities. Expectations related to data interpretation, critical reasoning, or sociopolitical applications of mathematics are rarely made explicit in SEA documents.

These patterns indicate that SEA systems prioritize access to mathematics and language development but provide limited guidance for fostering identity-affirming, agentic, and critically engaged mathematics learning environments.

Invisibility and Conflation of Latino Students With English Learner Students

A third cross-SEA finding is the limited explicit attention to Latino students as a distinct population, along with a strong emphasis on English Learner students or Multilingual Learners. Across document sets, searches using terms such as “Latino” or “Hispanic” most frequently yield materials related to English Learner policy, language development, or program compliance rather than mathematics-specific guidance or culturally grounded resources.

This pattern suggests that Latino students are often represented within SEA systems primarily through a language-based classification, with Latino identity implicitly or explicitly equated with English Learner status. As a result, the diversity of Latino student experiences—including variation in language proficiency, cultural identity, national origin, race, and educational background—is not consistently reflected in policy or guidance.

The conflation of Latino students with English Learner students can obscure important distinctions, including the needs of Latino students who are not classified as English Learners and the range of linguistic and cultural assets present within Latino communities. More broadly, it reflects a tendency across SEAs to conceptualize equity in terms of aggregated categories rather than differentiated groups with intersecting identities.

This generalized framing has implications for how mathematics learning is positioned. Without explicit attention to students’ cultural and sociopolitical contexts, opportunities to connect mathematics to students’ lived experiences—and to support culturally sustaining and critically oriented learning—remain limited.

Implications and Recommendations

These results suggest implications for the field to consider. The three emerging themes of siloing, differential focus on principles, and invisibility of Latino students or their conflation with English Learner students point to a need for greater attention to the vision of quality algebra learning emerging from research and articulated in the five principles detailed in this study. Further variation in the student outcomes underscores the urgency of addressing the experiences of English Learner and Latino students in learning algebra. To advance policy, programs, and practice in this area, we (the authors of this study) recommend that SEAs engage in the following three practices.

Reflect on Multilayered Alignment With Principles

It can be useful to consider the principles of quality algebra learning at multiple levels, as described in earlier sections: the student experience (Table 2), teacher pedagogy and practice (Table 3), and instructional materials (Table 4). We have begun conducting conversations with SEA leaders, and initial emerging themes have found the opportunity for reflection to be valuable even when much of the work may not be visible in published documents. Reflecting on the relative strength of evidence of the principles from student, teacher, and instructional material perspectives can assist SEAs in continuous improvement around maximizing the reach and impact of investments in professional learning. Such reflection should further aim to break down institutional barriers to alignment and coherence by collaborating across departments and documents.

Build on Successes in Integrating Mathematics and Language

Although the relative lack of attention to agency, identity, and criticality is in line with national trends (Comstock et al., 2026), given the greater prevalence of integrating mathematics initiatives with support for English Learner students, we suggest building from the lessons



learned by SEAs in developing those synergies and alignment to drive improvement in other areas. Through the reflection and review they can conduct with regard to the principles at different layers of the system, SEAs can prioritize whatever other dimensions of agency, identity, and criticality can be addressed in the short term and what will need more concerted development over time, including the processes of authoring new policy or guidance and developing new forms of technical assistance and professional learning. Strong frameworks, guidance, and technical assistance in each of the principles is necessary, but further work will need to be done to fully integrate all principles into practice.

Learn in Networks to Share Successes

SEAs play a critical role, distinct from those of LEAs and schools, in fostering quality learning for English Learner and Latino students. The influence of SEAs is indirect but crucial in the area of adopting HQIM and investing in the development of teacher expertise through professional learning programs. SEAs learn in communities of practice with their peers to identify how to best leverage the frameworks, guidance, and technical assistance to accelerate the development of human, organizational, resource, and policy capacity. Promising approaches include statewide investments in coaches, stable multiyear professional learning communities, and other options for deep but contingently adjusted and adaptive professional learning. SEAs will need to develop universal, targeted, and intensive supports for LEAs and educators to advance quality algebra learning for English Learner and Latino students.



References

- Bunch, G. C. (2013). Pedagogical language knowledge: Preparing mainstream teachers for English Learners in the new standards era. *Review of Research in Education*, 37(1), 298–314. <https://doi.org/10.3102/0091732X12461772>
- Choppin, J., Roth McDuffie, A., Drake, C., & Davis, J. (2022). The role of instructional materials in the relationship between the official curriculum and the enacted curriculum. *Mathematical Thinking and Learning*, 24(2), 123–148. <https://doi.org/10.1080/10986065.2020.1855376>
- Chu, H., & Bañuelos, G. R. (2015). Aligning multidimensional teacher evaluation with professional development centered on English Language Learners. In K. O'Hara (Ed.), *Teacher evaluation: The charge and the challenges* (pp. 159–184). Peter Lang.
- Chu, H., & Evans, M. (2025). *Rethinking language in mathematics for English Learners: Connecting theory, research, and practice*. National Research and Development Center to Improve Education for Secondary English Learners at WestEd.
- Chu, H., & Hamburger, L. (2019). Designing mathematical interactions for English Learners. *Mathematics Teaching in the Middle School*, 24(4), 218–225. <https://doi.org/10.5951/mathteachmidscho.24.4.0218>
- Chu, H., & Hamburger, L. (2022). Educative curriculum materials for English Learners: Varying the intensity of scaffolding. In L. de Oliveira & R. Westerlund (Eds.), *Scaffolding for Multilingual Learners in elementary and secondary schools* (pp. 181–196). Routledge.
- Chu, H., & Jackson, B. (2025). *Engaging English Learners with equivalence as a crosscutting concept in mathematics*. National Research and Development Center to Improve Education for Secondary English Learners at WestEd.
- Chu, H., & Rubel, L. H. (2013). When the world is not the problem: Real-world contexts in analogies. In M. Berger, K. Brodie, V. Frith, & K. le Roux (Eds.), *Proceedings of the Seventh International Mathematics Education and Society Conference* (pp. 262–271). Mathematics Education and Society.
- Chu, H., Tran, T., & Hamburger, L. (2022). *Redefining approaches for engaging English Learners with mathematical ideas*. National Research and Development Center to Improve Education for Secondary English Learners at WestEd.
- Coburn, C. E. (2003). Rethinking scale: Moving beyond numbers to deep and lasting change. *Educational Researcher*, 32(6), 3–12. <https://doi.org/10.3102/0013189X032006003>



- Cohen, D. K., Spillane, J. P., & Peurach, D. J. (2018). The dilemmas of educational reform. *Educational Researcher*, 47(3), 204–212. <https://doi.org/10.3102/0013189X17743488>
- Comstock, M., Kaul, M., & Kim, S. (2026). *Embrace, contradiction, or prohibition: A national scan of state policies for Culturally Responsive and Sustaining Education* (EdWorkingPaper: 26-1488). Annenberg Institute at Brown University. <https://doi.org/10.26300/bghv-pk71>
- Cunningham, J., Jackson, B., & Neri, R. (2025). *REAL Mathematics practical measurement toolkit: Tools to support relevant, engaging, and applied learning in mathematics*. WestEd.
- Cunningham, J., Neri, R., & Sandoval, C. (2024). *Building mathematics teachers' capacity to enact culturally responsive and sustaining education*. WestEd.
- Darling-Hammond, L., Hyler, M., & Gardner, M. (2017). *Effective teacher professional development*. Learning Policy Institute.
- de Araujo, Z., Roberts, S. A., Willey, C., & Zahner, W. (2018). English Learners in K–12 mathematics education: A review of the literature. *Review of Educational Research*, 88(6), 879–919. <https://doi.org/10.3102/0034654318798093>
- de Araujo, Z., & Smith, E. (2022). Examining English Language Learners' learning needs through the lens of algebra curriculum materials. *Educational Studies in Mathematics*, 109(1), 65–87. <https://doi.org/10.1007/s10649-021-10081-w>
- Derewianka, B., & Jones, P. (2023). *Teaching language in context* (3rd ed.). Oxford University Press.
- Erath, K., Ingram, J., Moschkovich, J., & Prediger, S. (2021). Designing and enacting instruction that enhances language for mathematics learning: A review of the state of development and research. *ZDM*, 53, 245–262.
- Gallagher, H. A., Faw, L., & Cottingham, B. (2026). *How districts scale instructional improvement that lasts*. Policy Analysis for California Education.
- García, O., Woodley, H. H., Flores, N., & Chu, H. (2013). Latino emergent bilingual youth in high schools: Transcaring strategies for academic success. *Urban Education*, 48(6), 798–827. <https://doi.org/10.1177/0042085912462708>
- Gutiérrez, R. (2002). Beyond essentialism: The complexity of language in teaching mathematics to Latina/o students. *American Educational Research Journal*, 39(4), 1047–1088. <https://doi.org/10.3102/000283120390041047>



- Gutiérrez, R. (2012). Context matters: How should we conceptualize equity in mathematics education? In B. Herbel-Eisenmann, J. Choppin, D. Wagner, & D. Pimm (Eds.), *Equity in discourse for mathematics education* (pp. 17–33). Springer.
https://doi.org/10.1007/978-94-007-2813-4_2
- Gutstein, E. (2003). *Reading and writing the world with mathematics: Toward a pedagogy of social justice*. Routledge.
- Hamburger, L., & Chu, H. (2025). Developing conceptual understandings of mean as point of balance with Multilingual Learners: Redesigning mathematical learning with quality interactions. In A. Walqui, G. Bunch, & P. Mueller (Eds.), *Amplifying the curriculum: Designing quality learning opportunities for Multilingual Learners* (2nd ed., pp. 157–178). Teachers College Press.
- Harris-Thomas, B., Nicolai, K. D., Chen, X.-Y., & Barbieri, C. A. (2026). Examining Black and Latine students' sense of belonging within the mathematics classroom: A narrative review. *Educational Psychology Review*, 38, Article 81. <https://doi.org/10.1007/s10648-026-10181-0>
- Hernandez, M., Lopez, D., & Swier, R. (2022). *Dismantling disproportionality: A culturally responsive and sustaining systems approach*. Teachers College Press.
- Hill, H. C., Ball, D. L., & Schilling, S. G. (2008). Unpacking pedagogical content knowledge: Conceptualizing and measuring teachers' topic-specific knowledge of students. *Journal for Research in Mathematics Education*, 39(4), 372–400.
- Instruction Partners. (n.d.). *The state of instructional (in)coherence: How state guidance causes confusion and what SEAs can do to fix it*.
- Irwin, V., Wang, K., Jung, J., Kessler, E., Tezil, T., Alhassani, S., Filbey, A., Dilig, R., & Bullock Mann, F. (2024). *Report on the condition of education 2024* (NCES 2024-144). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. <https://nces.ed.gov/pubs2024/2024144.pdf>
- Kennedy, M. (2016). How does professional development improve teaching? *Review of Educational Research*, 86(4), 945–980.
- Lee, S., Woo, A., Kaufman, J., & Doan, S. (2025). *Lost in translation—Teachers report feeling unprepared to support Multilingual Learners*. RAND.
- Lemke, J. (2003). Mathematics in the middle: Measure, picture, gesture, sign, and word. In M. Anderson, A. Sáenz-Ludlow, S. Zellweger, & V. Cifarelli (Eds.), *Educational perspectives on mathematics as semiosis: From thinking to interpreting to knowing* (pp. 215–234). Legas.



- Mellom, P. J., Straubhaar, R., Balderas, C., Ariail, M., & Portes, P. R. (2018). “They come with nothing”: How professional development in a culturally responsive pedagogy shapes teacher attitudes toward Latino/a English Language Learners. *Teaching and Teacher Education*, 71, 98–107. <https://doi.org/10.1016/j.tate.2017.12.013>
- Molina, C. (2012). *The problem with math is English: A language-focused approach to helping all students develop a deeper understanding of mathematics*. Jossey-Bass Teacher.
- National Academies of Sciences, Engineering, and Medicine. (2017). *Promoting the educational success of children and youth learning English: Promising futures*. National Academies Press.
- National Academies of Sciences, Engineering, and Medicine. (2018). *English Learners in STEM subjects: Transforming classrooms, schools, and lives*. National Academies Press.
- National Assessment Governing Board. (n.d.). *The Nation’s Report Card (NAEP): NAEP Math—US math score trends*. Retrieved May 20, 2026, from <https://www.nagb.gov/naep/mathematics.html>
- National Council of Teachers of Mathematics. (2000). *Principles and standards of school mathematics*.
- National Council of Teachers of Mathematics. (2025). *High school mathematics: Reimagined, revitalized, and relevant*.
- Neri, R. C., Lozano, M., & Gomez, L. M. (2019). (Re)framing resistance to culturally relevant education as a multilevel learning problem. *Review of Research in Education*, 43(1), 197–226.
- Neri, R. C., Sandoval, C., Mallett Moore, E., Cunningham, J., Jacobs, J., & Allen, Y. (2023). *A research agenda for culturally responsive and sustaining education in mathematics*. WestEd.
- Office of English Language Acquisition. (2021). *Integrating language while teaching mathematics: NCELA teaching practice brief*.
- Office of English Language Acquisition. (2025). *The biennial report to Congress on the implementation of the Title III state formula grant program, school years 2020–22*.
- O’Halloran, K. (2005). *Mathematical discourse: Language, symbolism, and visual images*. Continuum.
- Opfer, D., Kaufman, J., & Thompson, L. (2016). *Implementation of K–12 state standards in mathematics and English language arts and literacy*. RAND Corporation.



- Paris, D., & Alim, H. S. (2014). What are we seeking to sustain through culturally sustaining pedagogy? A loving critique forward. *Harvard Educational Review*, 84(1), 85–100.
<https://doi.org/10.17763/haer.84.1.982l873k2ht16m77>
- Paris, D., & Alim, H. S. (2017). *Culturally sustaining pedagogies: Teaching and learning for justice in a changing world*. Teachers College Press.
- Qin, K., Wolf, J., & Llosa, L. (2025). From everyday language to disciplinary discourse: Culturally and linguistically sustaining dialogic instruction with Multilingual Learners. *TESOL Journal*, 16(1), Article 3913. <https://doi.org/10.1002/tesj.913>
- Roberts, S. A., de Araujo, Z., Willey, C., & Zahner, W., (2022). Three ways to enhance tasks for Multilingual Learners. *Mathematics Teacher: Learning and Teaching PK–12*, 115(7), 458–467. <https://doi.org/10.5951/MTLT.2021.0300>
- Rubel, L. H. (2017). Equity-directed instructional practices: Beyond the dominant perspective. *Journal of Urban Mathematics Education*, 10(2), 66–105.
- Rubel, L. H., & Chu, H. (2012). Reinscribing urban: Teaching high school mathematics in low income, urban communities of color. *Journal of Mathematics Teacher Education*, 15, 39–52. <https://doi.org/10.1007/s10857-011-9200-1>
- Shulman, L. S., & Shulman, J. H. (2004). How and what teachers learn: A shifting perspective. *Journal of Curriculum Studies*, 36(2), 257–271.
<https://doi.org/10.1080/0022027032000148298>
- Sims, S., Fletcher-Wood, H., O’Mara-Eves, A., Cottingham, S., Stansfield, C., Goodrich, J., Van Herwegen, J., & Anders, J. (2025). Effective teacher professional development: New theory and a meta-analytic test. *Review of Educational Research*, 95(2), 213–254.
<https://doi.org/10.3102/00346543231217480>
- Stein, M., Henningsen, M., Smith, M., & Silver, E. (2009). *Implementing standards-based math instruction: A casebook for professional development* (2nd ed.). Teachers College Press.
- van Lier, L. (2004). *The ecology and semiotics of language learning: A sociocultural perspective*. Kluwer Academic Publishers.
- Walqui, A. (2008). The development of teacher expertise to work with adolescent English Learners: A model and a few priorities. In L. S. Verplaetse & N. Migliacci (Eds.), *Inclusive pedagogy for English Language Learners : A handbook of research-informed practices* (pp. 103–125). Lawrence Erlbaum.
- Walqui, A., Bunch, G., & Mueller, P. (2025). *Amplifying the curriculum: Designing quality learning opportunities for Multilingual Learners* (2nd ed.). Teachers College Press.



- Walqui, A., & van Lier, L. (2010). *Scaffolding the academic success of adolescent English Language Learners: A pedagogy of promise*. WestEd.
- Walrond, N., & Romer, N. (2021). *Serving the whole person: An alignment and coherence guide for state education agencies*. WestEd. <https://www.wested.org/resource/serving-the-whole-person-an-alignment-and-coherence-guide-for-state-education-agencies/>
- Walton, G. M., & Cohen, G. L. (2011). A brief social-belonging intervention improves academic and health outcomes of minority students. *Science*, 331(6023), 1447–1451. <https://doi.org/10.1126/science.1198364>
- Warner, S. (2025). *Essential characteristics of culturally responsive and sustaining education in mathematics curriculum materials: Sample lessons*. WestEd.
- WestEd. (2025). *Realizing Multilingual Learners’ immense promise in mathematics: Policies that enable ambitious practice*. WestEd.
- Wilson, J., & Smith, E. (2022). Increasing Multilingual Learners’ access in mathematics. *Mathematics Teacher: Learning and Teaching PK–12*, 115, 104–112.



Appendix: Document Selection and Analyses

Data Sources: SEA Policy Documents

Documents to include in the scan were identified through a structured, replicable search protocol using key search terms (Table A1) applied across all SEAs. As part of the document identification and collection process, the research team incorporated the use of artificial intelligence (AI) tools to systematically retrieve publicly available materials. AI-assisted retrieval was used solely to enhance the breadth and efficiency of the search process.

Table A1. Key Search Terms for SEA Documents

Student characteristics	Learning processes	Systems-level factors
English Learner, Multilingual Learner, emergent bilingual, long-term English Learner, Latino, national origin, newcomer	language development, academic language, discourse, culturally responsive, culturally sustaining, CRSE, equity, identity, belonging, agency	instructional materials, standards, professional learning, coaching, remediation, formative assessment, reclassification, family & community engagement

Analyses

The study’s analyses used a deductive coding framework aligned with ecological dimensions (materials, pedagogy, professional learning) and rubrics for the five principles of quality algebra learning. The analyses were used to develop a “snapshot,” an emerging narrative profile of 1–2 pages that could be shared with the 13 focal SEAs. Cross-state comparisons were then conducted using a matrix approach to identify patterns across ecological dimensions, the five principles, coherence, and the manner in which Latino students and English Learner students are defined.