Guidelines for Improving Math Materials for English Learners

Our Mission

Our dream is for students classified as English learners (ELs) to experience schools that recognize their educational needs, value the cultural and linguistic assets they bring, and provide an environment in which they can thrive socially, emotionally, and academically. The English Learners Success Forum (ELSF) believes quality teaching paired with effective instructional guidance is critical to the academic success of ELs.

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[1] Instructional Materials Evaluation Toolkit, EQuIP rubrics, Council of the Great City Schools' ELL Framework, Understanding Language's Principles for the Design of Mathematics Curricula: Promoting Language and Content Development

1 About the ELSF Guidelines

Introduction

These *Guidelines for Improving Math Materials for English Learners* (the *Guidelines*) were developed to provide specific guidance to developers of mathematics content on key areas of English language development that must be embedded across a curricula, in units, and in lessons so that English learner students (ELs) can access and engage in grade-level content. ELSF believes that a curriculum reflecting these research-informed EL strategies and best practices will provide the necessary foundation for the simultaneous development of disciplinary knowledge, language and literacy for ELs as well as guide teachers to be more inclusive of the various needs of ELs, ultimately leading to a significant increase in EL students' access to grade-level content.

ELSF approach reflects the belief that students with developing levels of English proficiency require instruction that carefully supports their understanding and use of emerging language as they participate in content learning. Quality teaching paired with effective instructional guidance is critical to the academic success of students classified as English learners (ELs). Instructional materials must provide grade-level access for ELs to engage in mathematics content and meet the demands of college- and career-ready (CCR) standards. Unfortunately, many educators feel that materials developed to support math learning for ELs neither reflect the rigor of CCR standards nor are they designed to raise the academic performance of ELs.[2] Most grade-level instructional materials developed and intended for native English speakers rarely include intentional support for students who are progressing in their English language development.

It is estimated that more than half of U.S. public school teachers have at least one EL in their classroom, but less than 20 percent are certified to teach ELs.[3] We believe quality instructional materials paired with effective professional development will have a positive impact on EL academic learning. In fact, content developers should consider the needs of ELs as an integral part of their materials development process.

Language development experts and practitioners developed the Guidelines based on the most recent research on language development and instruction for ELs; they provide the foundation for the ELSF materials improvement process that elevates the academic language needs of ELs. The Guidelines reference concrete examples and guidance to aid others in developing content, including districts, schools, teachers, and organizations focused on instruction.

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2   [Instructional Materials for English Language Learners in Urban Public Schools, 2012-13](). Council of the Great City Schools

3   Brown & Doolittle, 2008; Waxman, Tellez, & Walberg, 2004

Why this work matters

The newest CCR standards place greater emphasis on disciplinary language and literacy demands, collaborative student engagement, and students using oral and written language. While beneficial for all students, ELs need specific support as they are simultaneously engaging with grade-level content while developing English proficiency. Classrooms vary tremendously across the U.S.; some classrooms have one single EL while others find that ELs are the majority of learners. Whether in rural, suburban, or urban schools, ELSF acknowledges that the best way to meet the needs of ELs is to provide support to teachers in a variety of ways, such as offering professional development on language pedagogy and referencing best practices and through the intentional design of the instructional materials themselves.

Existing evidence points to the impact of curriculum on student learning.[4] Educators can draw from sufficient research in order to understand how students develop English proficiency while engaging in ELA content at

the same time.[5] These Guidelines are consistent with recommendations approved by the National Academies of Science report, *Promoting the Educational Success of Children and Youth Learning English: Promising Futures*[6] and *The English Learner Toolkit*[7] by the Office of English Language Acquisition at the US Department of Education. In fact, some of the authors of these reports contributed to the development and refinement of these Guidelines. To make these guidelines unique and actionable, ELSF culled the most critical aspects of existing evidence of what works for ELs and organized them in way that is accessible for developers of curricula.

Demand for this work

Prior to launching, ELSF interviewed curriculum developers, national EL experts and practitioners, and organizations advocating for high-quality curriculum to explore why most core (ELA and mathematics) K–12 curricular materials are not inclusive of the needs of ELs. Findings reveal a lack of EL expertise on development staff, little concrete

guidance on how to integrate EL supports within instructional materials, and consultations with experts that offer only a singular perspective and fail to provide reflections from range of expertise within the EL instructional community. While EL experts are willing to support this work, they receive invitations to collaborate and engage in the process of materials development when it's too late in to make a significant contribution and impact.

ELSF was created to address these challenges directly:

1) the Guidelines were developed and reviewed by EL experts and practitioners from a variety of perspectives and vast ranges of experiences, including researchers, linguists, education leaders, and educators, and have contributed to various iterations leading to this version;

2) the Guidelines offer "the how" of EL supports within the context of curricular materials;

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4   Choosing Blindly: Instructional Materials, Teacher Effectiveness, and the Common Core

5   Teaching English Language Learners What the Research Does—and Does Not—Say

6   This 2017 Report can be found here

7   The English Learner Toolkit

3) ELSF works directly with content developers by offering cycles of feedback from experienced EL experts and practitioners based on the Guidelines; and

4) ELSF shares our learning through free tools and resources published on our website.

Who should use these Guidelines

ELSF believes that these Guidelines will benefit those who play a role in ensuring teachers have access to curricular materials that are high-quality and considers the needs of *all* students, including ELs. Audiences may include:

- **Content developers**
  Ideally integrated into the design, prototyping, or creation of any new curricula, these Guidelines can be used by any developer of curriculum, which may include *publishers, state education agencies,* *districts, schools or teachers,* to ensure effective English language development is integrated and robust throughout the materials. Additionally, those seeking to *adapt or enhance current materials* to be more inclusive of the needs of ELs can use the Guidelines to self-assess their EL supports (as outlined in the Guidelines) and revise materials to reflect the strategies and practices within each Area of Focus.

- **Professional learning communities**
  ELSF believes content and language should be taught simultaneously. Leaders who are looking for practical ways to support math teachers with ELs in their classrooms could consider using the Guidelines within professional learning communities time.

- **Education leaders considering new curriculum**
  At minimum, each of the Guidelines should be reflected in high-quality core ELA materials that claim to be inclusive of the needs of ELs. Leaders may use the Guidelines as a tool for reflecting on current support for ELs, finding gaps, and determining appropriate actions to meet EL needs. *Note:* The Guidelines respond to and build on the foundational work done by our partners at the Council of the Great City Schools,[8] Stanford University's Understanding Language,[9] and recent EL research, a reference that, in addition to these Guidelines, will benefit all audiences when considering the needs of ELs.

This tool offers guidance on intentional language support across a curriculum and does not gauge for alignment to CCR standards. ELSF advises all content developers to utilize tools developed for this purpose[10] while using the Guidelines. In addition, these Guidelines are not intended to replace English Language Proficiency Standards[11] but instead are to provide ELs access to grade-level content.

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8   The Council of the Great City Schools' Re-envisioning English Language Arts and English Language Development for English Language Learners provides direction on raising expectations and instructional rigor for ELs, approaches and delivery models of English language development, and a general process and key features for evaluating quality instructional materials for ELs.

9   Resources at Understanding Language at Stanford University, including Language, Literacy, and Learning in the Content Areas, offer general content area guidelines for teachers and others engaged in instructional and materials design that maximize alignment with the CCR standards for ELs.

10 Tools to evaluate alignment to CCR standards, such as the Instructional Materials Evaluation Toolkit

11 Framework for English Language Proficiency Development Standards corresponding to the Common Core State Standards and the Next Generation Science Standards

2 English Learners

To meet the academic needs of ELs, instruction must consider the language development needs of ELs,[12] whether students are newcomers to U.S. schools, students with limited or interrupted formal education (SLIFE) or long-term ELs (LTELs). Additionally, ELs have a range of experiences related to their language, culture, and with English in or outside of school that instructors can leverage for learning. This section describes how materials should consider these differences.

ELSF's approach reflects the belief that students with developing levels of English proficiency[13] can thrive academically, but that they require instruction and materials that carefully support their understanding and use of emerging language as they participate in content learning.[14] Instructional materials must provide access for ELs to engage in content-area work and meet the demands of CCR standards at their own grade-level[15] as well as guide core content teachers, who may have received little training in simultaneous language and content instruction, in meeting the challenge of providing that access to all students under their instruction.

ELSF's approach and guidelines also reflect a broader equity perspective into which ELs fit: the Guidelines recognize that ELs' languages, cultures, and funds of knowledge are intellectual resources that will enhance learning.[16] One-size-fits-all approaches do not attend to the heterogeneity of the EL population.

General education materials typically rely on a teacher's ability to know how to differentiate instruction appropriately for students, which is problematic when only one out of four teachers received training on how to do this for ELs. However, ELSF believes materials can and should help teachers attend to the language demands within lessons and support ELs in developing disciplinary knowledge and academic language. Materials can help guide teachers to recognize when and how to implement language supports and how to ensure students are understanding concepts.

Because states use a variety of frameworks and tests to measure student language proficiency, we do not suggest that content developers use any one framework in their curriculum, but rather that they differentiate instruction according to student needs as follows:

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12 States and school districts vary in how they define ELs, see CCSSO's Moving Towards a More Common Definition of English Learner

13 ELSF's tools and materials reflect the belief that language development is not a linear process, as has been previously believed, and that English proficiency may develop faster in one modality (receptive, productive, interactive) or domain (reading, writing, listening, speaking) than another.

14 Zwiers, et al, 2017; Walqui, A. & van Lier, L. (2010). Scaffolding the academic success of adolescent English language learners: A pedagogy of promise. San Francisco: WestEd.

15 Zwiers, et al, 2017; Moschkovich, 2013

16 Civil, 2007; Celedón-Pattichis & Ramirez, 2012; Gonzalez, Moll, & Amanti, 2013; Bunch, Kibler, & Pimentel, 2012; Gutiérrez & Rogoff, 2003

- **Emerging ELs:**
Students at this level have limited receptive and productive English skills. As they progress, students will begin to respond and engage in class using basic English communication skills in social and academic contexts. Intensive, accelerated, content-based instruction is required for ELs at this level and general education materials typically do not provide the necessary language development support, which requires a reliance on a teacher's ability to differentiate instruction accordingly. However, materials should acknowledge that emerging ELs can engage in complex, cognitively demanding tasks requiring language when provided with substantial linguistic support. For example, to access grade-level concepts and build the skill of reading and writing, materials can provide high-level guidance to teachers on how to scaffold instruction appropriately by tapping into students' own backgrounds and dominant language or by allowing multiple opportunities to engage in disciplinary themes at increasingly difficult levels of complexity.

- **Developing ELs:**
These students are beyond newly-emerging levels of English proficiency and can utilize learned phrases in English to communicate and engage in social and academic settings. As they progress, they will be able to engage in increasingly more complex, cognitively demanding situations in English. Students at this level require continued targeted language development instruction (i.e. reading shorter segments of texts to explore language usage). All instructional materials should aim to address the language demands from this level until students achieve proficiency. Note that though students may exit EL status, continued language instruction is critical.

- **Expanding ELs:**
Students at this level can communicate appropriately according to tasks and purpose. They can adapt communication based on social and academic contexts and are working towards refining and enhancing their English skills to meet academic demands across the disciplinary areas. Because they can engage in complex, cognitively demanding activities at this level, they will need lighter linguistic supports as they become more comfortable with understanding and using highly technical English.

A note about long-term ELs (LTELs): It is estimated that 60% of ELs in grades 6-12 are classified as LTELs, meaning they have been enrolled in U.S. schools for 5+ years and have not been deemed "proficient" according to the criteria set by their district/state.[17] However, LTELs usually have high levels of social language abilities, but have fallen behind their peers in academic language. Several factors contribute to this "long-term" status, including little to no targeted linguistic support throughout their education or placement in inconsistent or mediocre program models.[18] LTELs, who are often developing proficiency and require concentrated language support, need instruction that is highly engaging and includes meaningful tasks.

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17 LTEL definition according to the Every Student Succeeds Act.

18 Olsen, 2014

3 Guidelines and Specifications

The Guidelines in this next section explicitly elevate opportunities for simultaneous language and disciplinary knowledge development in instructional materials. The first table of this section (Table 1) includes an overview of the five math Areas of Focus and the 15 Guidelines. These Guidelines reflect the fundamental aspects of language and content development and are the basis for ELSF materials review and feedback.

Organized by Areas of Focus, the subsequent tables provide detailed specifications that accompany each Guideline. These specifications include explanations, suggestions, strategies, supports, and models that demonstrate how educators can use these Guidelines operationally in materials development.

Table 1 below provides a preview of the Areas of Focus and research–informed Guidelines for Math materials that provide quality supports for ELs.

Area of Focus I: Interdependence of Mathematical Content, Practices, and Language	Area of Focus II: Scaffolding and Supports for Simultaneous Development	Area of Focus III: Mathematical Rigor Through Language	Area of Focus IV: Leveraging Students' Assets	Area of Focus V: Assessment of Mathematical Content, Practices, and Language
1. Strategic opportunities to use and refine both language and mathematics over time 2. Explicit mathematics and language learning goals and pathways 3. Regular and varying opportunities to learn, reflect upon, and demonstrate learning of mathematics using a variety of modes and forms	4. Opportunities for students to interact with and produce a variety of methods and representations 5. Directions for providing specialized individual and small group instruction to ELs 6. Guidance for anticipating potential language demands and opportunities in student activities	7. Explicit guidance for teachers to engage students in using mathematical practices 8. Maintain appropriate challenge and high expectations of mathematics learning for EL students 9. Guidance for facilitating mathematical discussion and co-construction of meaning	10. Opportunities to draw on and incorporate students' cultural background and lived experiences in mathematics learning 11. Suggestions for incorporating and valuing ELs' written and spoken contributions 12. Encouragement for ELs to use and build on existing language resources	13. Descriptions, illustrations, and examples of quality work and mathematical practices with varying levels of language proficiency 14. Assessments able to capture and measure students' mathematics and language progress over time 15. Guidance for recognizing and attending to student language produced to inform instructional decisions

The tables that follow outline the Specifications (including ELD models, explanations, practices, strategies, and supports) for meeting the corresponding evidence-based guidelines. EL review teams and content developers collaborate to review and provide specific, actionable feedback on curricular materials using the Guidelines.

Area of Focus I: Interdependence of Mathematical Content, Practices, and Language

1. Strategic opportunities to use and refine both language and mathematics over time	2. Explicit mathematics and language learning goals and pathways	3. Regular and varying opportunities to learn, reflect upon, and demonstrate learning of mathematics using a variety of modes and forms
1a. Materials highlight, define, illustrate, and show the purpose for mathematical language within the context of the lesson (not in isolation).	**2a.** Teacher materials state clear and specific language objectives both for math practices as well as for academic purposes that cut across disciplines	**3a.** Activities deepen and extend learning through the various modes of communication: speaking, listening to deepen and extend learning through varied modes: speaking, listening, reading, and writing
1b. Materials guide teachers encourage students to build their own understanding of mathematics actively, using language to actively build their own understanding of mathematics, using language, through sustained activities and experiences.	**2b.** Student materials contain mathematics and language learning objectives.	**3b.** Materials include prompts for students to reflect on their own thought processes, language use, methods, and learning of mathematical content
1c. Materials provide strategies to help students make connections between current language, new language, and mathematical concepts.	**2c.** Teacher materials articulate a pathway or progression of objectives for content, practices, and language throughout units	**3c.** Materials encourage students to utilize interdisciplinary words and phrases as well as math-specific words and phrases.
1d. Units offer repeated opportunities to develop, refine, and extend language for mathematical purposes over time	**2d.** Materials present opportunities for students to use language at different stages within a unit, such as speculating or predicting about a new topic, exploring and reflecting during an experience, presenting afterwards, etc.	

Examples and Resources:

1. Vocabulary Pieces, Roots, And Families; Mathematically Speaking; Strategic Grouping for Home Language Supports

1a. Spiralling Math and Language Content; Analyzing Content and Language Demands; Rumors

1b. Anchor Charts: A Vocabulary Strategy; Bounce Cards for Primary Grades (Spanish and other L1s), Primary Grades (English), Intermediate Grades (English), Spiralling Math and Language Content; Talk Moves

Chval, Pinnow & Thomas, 2014; Vomvoridi-Ivanović & Chval, 2014

Examples and Resources:

3a. Information Barrier Game: Interactive Partner Activity; Dictogloss

3b. Nonverbal and Verbal Communication Routine; Anchor Charts: A Vocabulary Strategy

Collect and Display; Think-Aloud

3c. Anchor Charts: A Vocabulary Strategy

Collect and Display; Think-Aloud

Area of Focus II: Scaffolding and Supports for Simultaneous Development

4. Opportunities for students to interact with and produce a variety of methods and representations	**5.** Directions for providing specialized individual and small group instruction to ELs	**6.** Guidance for anticipating potential language demands and opportunities in student activities
4a. Learning activities provide ways for students to generate and interpret a range of mathematical methods and representations (symbols, manipulatives, graphs, tables, words, etc.) and methods	**5a.** Teacher materials point to strategic opportunities for teachers to meet directly with EL students individually and in small groups	**6a.** Teacher materials make suggestions for addressing possible language issues that may interfere with engagement of math content
4b. Teacher materials provide guidance to encourage students to draw comparisons and connections across different methods and representations.	**5b.** Teacher materials give guidance on what to look for, listen for, questions to ask, and/or feedback to give when meeting with EL students	**6b.** Materials demonstrate activities and ways to help students make meaning of typical mathematical texts such as word problems, graphs, tables, etc.
4c. Unit of study includes multiple sensory modalities for student interaction	**5c.** Materials present a balance of opportunities for independent, paired, small-group, and whole-class activities	**6c.** Materials provide activities to help distinguish between common everyday meanings of language and mathematical meanings (table, round, product, origin, similar, etc.) as they emerge in the materials
4d. Teacher materials provide supports for teacher modeling of reading, writing, listening, speaking, and thinking aloud		**6d.** Unit amplifies rather than simplifies English language structures and forms that are often used in mathematics

Examples and Resources:

4a. Dictogloss

4a., 4b. Group Activity: Problem Solving Quadrant

4b. Nonverbal and Verbal Communication Routine

Moschovich, 2012, Wong-Fillmore

Examples and Resources:

6a., 6c., 6d. Assessment of Student Writing and Oral Language Production

6b., 6c. Anchor Charts: A Vocabulary Strategy

Moschovich, 2012, Wong-Fillmore

Area of Focus III: Mathematical Rigor Through Language

7. Explicit guidance for teachers to engage students in using mathematical practices

8. Maintain appropriate challenge and high expectations of mathematics learning for EL students

9. Guidance for facilitating mathematical discussion and co-construction of meaning

7a. Materials have targeted opportunities for students to use and develop language functions while engaging in mathematical practices

7b. Teacher materials point out opportunities for students to evaluate and address mathematical errors, misconceptions, and clarity of communication

7c. Teacher materials provide opportunities for students to revise their own, peers', and/or fictitious mathematical writing

8a. Materials consistently provide access to cognitively-demanding tasks

8b. Teacher materials demonstrate when and how to support productive struggle before intervening

8c. Materials guide the implementation of anchor charts, visual aids, models, and other resources for students to use as a reference

9a. Materials include prompts for teachers to cultivate and facilitate back-and-forth mathematical discussions between students that refer to and build on each other's ideas

9b. Materials provide explicit purposes for communication between students

9c. Materials allow for equitable participation and risk-taking in conversations

Examples and Resources:

7b., 7c. Choose and Defend

Reading and Understanding the Problem; Three Reads; Jigsaw Reading, Collect and Display, Critique, Correct, and Clarify

Examples and Resources:

Three Reads

Examples and Resources:

9b., 9c. Information Barrier Game: Interactive Partner Activity

Compare and Connect; Mathematically Speaking

Area of Focus IV: Leveraging Students' Assets

10. Opportunities to draw on and incorporate students' cultural background and lived experiences in mathematics learning	**11.** Suggestions for incorporating and valuing ELs' written and spoken contributions	**12.** Encouragement for ELs to use and build on existing language resources
10a. Teacher materials include relevant and practical suggestions for connecting mathematics content and practices to students' lives **10b.** Materials encourage students to draw on prior knowledge, culture, and experiences **10c.** Materials offer opportunities for clarifying potentially unfamiliar contexts	**11a.** Teacher materials contain examples (and non-examples) of evidence of students with various language strengths and needs engaged in mathematical practices **11b.** Teacher materials contain explicit guidance for teachers to examine their own values and beliefs about language, ELs, and ways in which that might impact their teaching	**12a.** Activities permit appropriate opportunities for ELs to use and integrate first language (L1) and everyday English in communicating mathematical thinking **12b.** Activities and materials present opportunities for students to ask and pursue their own questions and interests, using their own methods in their chosen contexts
Examples and Resources:	**Examples and Resources:**	**Examples and Resources:** **12.** Translanguaging Strategies; Strategic Grouping for Home Language Supports **12a.** Bounce Cards for Primary Grades (Spanish and other L1s)

Area of Focus V: Assessment of Mathematical Content, Practices, and Language

13. Descriptions, illustrations, and examples of quality work and mathematical practices with varying levels of language proficiency	**14.** Assessments able to capture and measure students' mathematics and language progress over time	**15.** Guidance for recognizing and attending to student language produced to inform instructional decisions

13a. Teacher materials should provide examples of teacher-student and student-student interactions that model and reflect the intent of mathematical practices **13b.** Teacher materials present examples in a way that highlight student potential for English proficiency, not deficit-based	**14a.** Assessments prompt student to use math practices through language (including but not limited to vocabulary) **14b.** Rubrics specifically identify and describe typical mathematical content, practice, and language achievements **14c.** Teacher materials suggest ways to capture students' progress from everyday language to language for more formal academic and mathematical purposes	**15a.** Teacher materials instruct teachers to avoid interpreting lower level language proficiency as lower level mathematics proficiency **15b.** Unit Includes a range of assessments for formative purposes that enable students to draw on and make use of their existing language resources **15c.** Summative assessment tools specifically identify, describe, and measure mathematical and language successes, errors, and misconceptions and guide teachers to score them accordingly

	Examples and Resources: **14a.** Talk Moves**;** Analyzing Content and Language Demands **14b.** Analyzing Content and Language Demands Collect and Display	**Examples and Resources:** **15.** Formative Assessment Considerations Collect and Display