Meeting the Needs of English Learners in Your Classroom

Classrooms reflect the salad bowl nature of today's society, a blend of many languages and cultures. As the population of English Learners (ELs) continues on an upward trend, educators are focusing on strategies to support these students effectively. They perceive that mathematics cannot be regarded as simply a "universal language" of numbers, but a way of expressing meaning that can be especially challenging to students with limited English proficiency. They consider the fact that while diverse students have diverse needs, strategies that support ELs in math learning can benefit all students in the classroom.

- Today's math is language-dependent. Once focused almost exclusively on computation, math education—including Common Core Mathematical Practices—now requires communication skills in speaking, reading, and listening.
- Along with increased expectations for students to share their mathematical thinking comes a new level of rigor, including a need for both conceptual understanding and procedural fluency.
- Encouraged to apply this understanding, children make connections between math and the real world.

Amid this canvas of considerations, a common thread emerges: the belief that all students—including English Learners—must be held to the same high expectations. These are important strategies for supporting ELs in your classroom:

- Employing precise language, extending beyond word choice
- Building understanding with visual models & tools
- Valuing multiple strategic pathways
- Communicating in various settings
- Differentiating instruction

"One of the goals of mathematics instruction for ELs should be to support all students, regardless of their proficiency in English, in participating in discussions that focus on important mathematical concepts and reasoning, rather than on pronunciation, vocabulary, or low-level linguistic skills."

» Judit Moschkovich
Mathematics, the Common Core, and Language: Recommendations for Mathematics Instruction for ELs Aligned with the Common Core

Precise Language—More Than Word Choice

Math content and practice standards express expectations for language use as well as numerical facility. Bridges second edition identifies two or more CCSS Mathematical Practices within each lesson. Two of these practices—attend to precision, and construct viable arguments and critique the reasoning of others—focus on discourse and academic language development.

In the Bridges curriculum, students have opportunities to make claims and support those claims with evidence while using precise language. Yet precise language goes beyond word choice. For example, students learn terms that differentiate between the symbolic notation "$n + 2$" (an expression) and "$n + 2 = 8$" (an equation.) While this use of terms is, indeed, precise, situational precision is far more important and encompasses a larger skill set. In Bridges, fifth graders sketch arrays demonstrating fraction multiplication. As they look at the pattern of arrays, ordered smallest to largest, they share observations and look for additional patterns, considering similarities and differences when fractions are multiplied by fractions, whole numbers, or mixed numbers. Instead of considering a rather imprecise claim like "When you multiply fractions, they get smaller," students might ask, "Which fraction multiplication problems make the product smaller?" and pose the conjecture that "This is what happens to the product when fractions less than 1 are multiplied by another fraction less than 1."

Precise claims of this kind do not rely on perfect vocabulary; rather they depend on investment in precision through mathematical practices. "We should remember that precise claims can be expressed in imperfect language and that attending to precision at the individual word meaning level will get in the way of students' expressing their emerging mathematical ideas." (Moschkovich, p. 22)

Bridges Teacher Guides integrate examples of teacher/student dialogue around each mathematical concept. These dialogues model the language teachers may use to elicit participation, inquiry, and understanding. Although these are not intended as scripts, you may want to highlight questions in the dialogue to try with your own students. In the dialogue you'll also find samples of language that students need in order to process learning along with everyday words they can use to explain their mathematical thinking.

The curriculum is structured to elicit both expressive and receptive language skills. Speaking, writing, drawing, listening, and reading are embedded within the lessons. During Work

"Learning to communicate mathematically is not merely or primarily a matter of learning vocabulary. During discussions in mathematics classrooms, students are also learning to describe patterns, make generalizations, and use representations to support their claims."

» Judit Moschkovich, Mathematics, the Common Core, and Language: Recommendations for Mathematics Instruction for ELs Aligned with the Common Core

Places, you might offer ELs sentence frames for guided practice to explicitly encourage discourse and accurate use of language.

Bridges provides further support through Word Resource, or vocabulary, cards in Spanish and English, and offers an engaging vocabulary app as digital counterpart. Bridges and Number Corner sessions reference mathematical vocabulary in the Materials section. An asterisk [*] identifies those terms for which Word Resource Cards are available. Consider hanging a pocket chart near the whiteboard and Number Corner area to display cards currently in use.

Visual Models & Tools

Bridges in Mathematics employs a multifaceted approach to build procedural fluency and conceptual understanding, including a strong emphasis on visual models. While all students benefit from the use of models and tools—as emphasized by Math Practices 4 & 5—visual models and physical tools become a rich source of language support for ELs. Hands-on materials allow "students to explore mathematical thinking with the aid of concrete models. Manipulatives can be helpful to all students and especially to ELs by minimizing and supporting a task's language requirements. Just as visual aids are important, manipulatives expand the range of senses students use to process concepts." (Wiest, 483)

The Bridges curriculum guides students along a gradual path from manipulatives and visual models to sketches and diagrams and then to the symbolic form. The idea of moving from the concrete to the abstract is foundational to Bridges, providing a supportive context for students to communicate mathematical thinking. "As students share and explain their solution processes, ways of understanding, and the tools and representations they used, students develop a repertoire of strategies and models to assist them in thinking about and making connections among mathematical concepts." (Borgioli, 188)

The Bridges classroom environment is rich in visuals that support student understanding. For example, teachers create anchor charts in conjunction with students, who then use them for ongoing reference. "Whenever possible, a visual, written, or pictorial record of key ideas (presented by students and teachers) should accompany any oral presentation. Some ideas for accomplishing such a visual record include the creation of a word and picture wall

or a museum walk of artfully displayed samples of student work labeled with key words (in English and the native languages)." (Borgioli, 189)

Number Corner features Calendar Grids with visual representations of myriad mathematical concepts, from fractions and decimals modeled with clocks and money to pictures of 3-D shapes as found in the physical environment. Work Place games include manipulatives such as base ten pieces, tiles, and pattern blocks. And Problems & Investigations routinely pose problem-solving situations that encourage students to select the visual models, strategies, and tools that make the most sense to them, while encouraging them to move toward increasingly efficient methods.

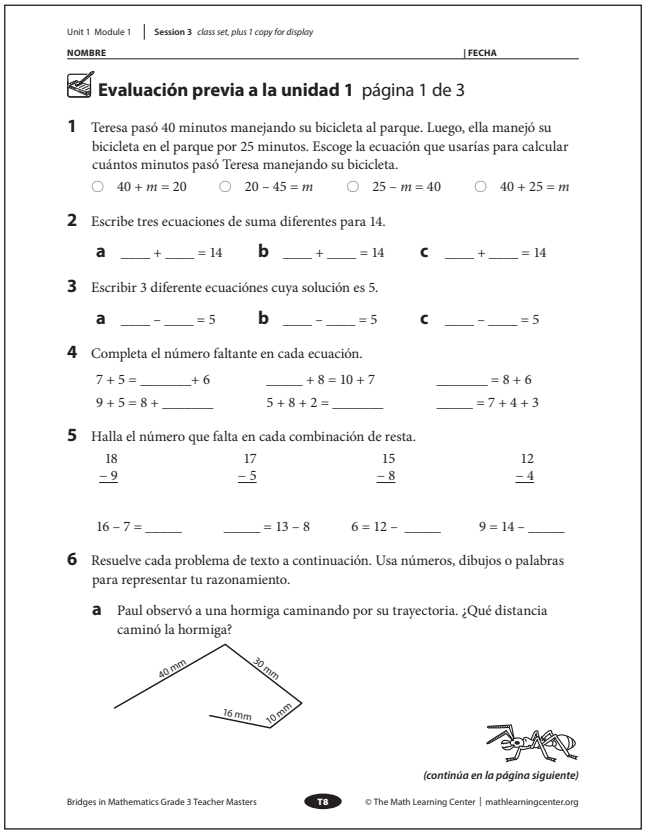
Multiple Pathways

Bridges builds upon student strengths by providing opportunities to share different ways to solve problems. When students adopt a growth mindset and a willingness to communicate their thinking, they come to appreciate multiple pathways to arrive at an answer, building on the idea that varied approaches—including diverse language and culture—are assets.

Roberto's Way	Emma's Way	Lucy's Way	Travis's Way	Midori's Way
36 + 28 30 + 20 = 50 6 + 8 = 14 50 + 14 = 64	20+ 30= 50 50 + 8 = 58 59, 60, 61, 62, 63, 64	28 + 36 28 + 2 = 30 30 + 34 = 64	28 + 36 28 + 2 = 30 30 + 32 = 66 66 − 2 = 64	1 28 + 36 64

True understanding of a concept includes more than a definition or series of steps. In Bridges, students demonstrate understanding by showing a variety of representations. For example, a student might demonstrate how the sum of different fraction combinations total 1—using visual representations on a number line, geoboard, or pattern blocks—and explain their thinking with written or oral language. You can support your diverse learners by centering the attention on meaning making rather than on linguistic accuracy.

Having a strong foundation in one's first language is a pathway to strengthening a second language. To that end, the Bridges material that students contact is available in Spanish. Offering these materials within Bridges' well-developed curriculum also supports student mathematical achievement in schools with immersion programs.



Unit 1 Module 1 | **Session 3** *class set, plus 1 copy for display*

NOMBRE | **FECHA**

Evaluación previa a la unidad 1 página 1 de 3

1 Teresa pasó 40 minutos manejando su bicicleta al parque. Luego, ella manejó su bicicleta en el parque por 25 minutos. Escoge la ecuación que usarías para calcular cuántos minutos pasó Teresa manejando su bicicleta.

○ $40 + m = 20$ ○ $20 - 45 = m$ ○ $25 - m = 40$ ○ $40 + 25 = m$

2 Escribe tres ecuaciones de suma diferentes para 14.

a ____ + ____ = 14 **b** ____ + ____ = 14 **c** ____ + ____ = 14

3 Escribir 3 diferente ecuaciónes cuya solución es 5.

a ____ – ____ = 5 **b** ____ – ____ = 5 **c** ____ – ____ = 5

4 Completa el número faltante en cada ecuación.

7 + 5 = _____ + 6 _____ + 8 = 10 + 7 _____ = 8 + 6

9 + 5 = 8 + _____ 5 + 8 + 2 = _____ _____ = 7 + 4 + 3

5 Halla el número que falta en cada combinación de resta.

18	17	15	12
– 9	– 5	– 8	– 4

16 – 7 = _____ _____ = 13 – 8 6 = 12 – _____ 9 = 14 – _____

6 Resuelve cada problema de texto a continuación. Usa números, dibujos o palabras para representar tu razonamiento.

a Paul observó a una hormiga caminando por su trayectoria. ¿Qué distancia caminó la hormiga?

(continúa en la página siguiente)

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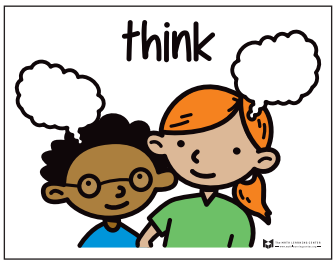
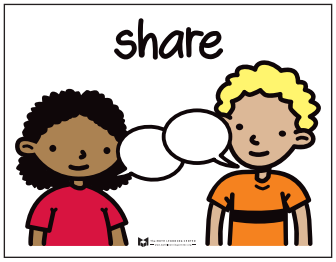
Multiple Communication Settings

One way that Bridges supports the new content and practice standards is by structuring lessons in which a mini lesson is modeled, practiced together, and applied in small groups or pairs. This format benefits students learning another language as it includes "time and support for mathematical discussions and use(s) a variety of participation structures (teacher-led, small group, pairs, students presentations, etc.) that support students in learning to participate in such discussions." (Moschkovich, p. 20)

"Wait time," critical to all students, is especially important for ELs. When you apply strategies like think-pair-share, you are inviting students to individually process and become accountable before sharing understanding in a larger group setting.

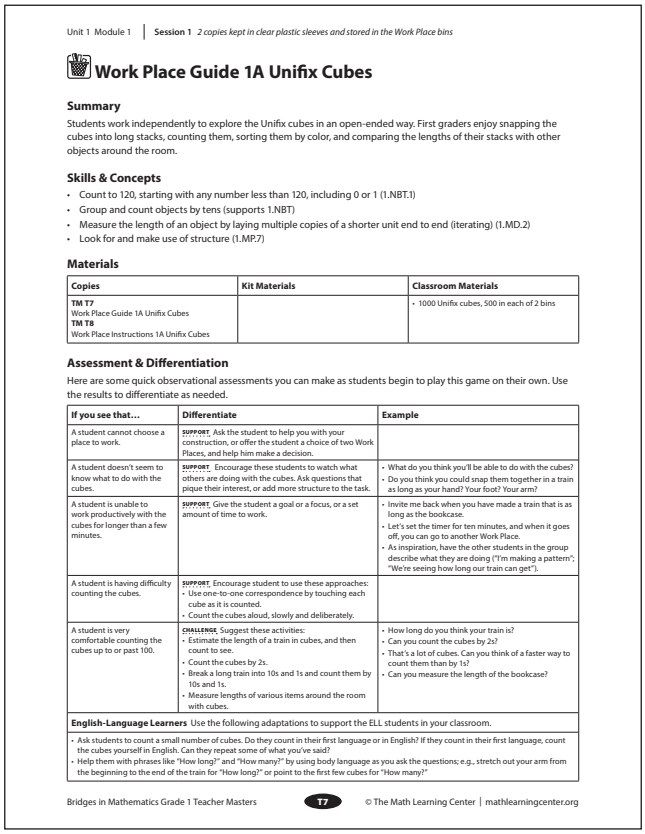




Differentiation

On the last page of each Bridges Unit Overview, a chart indicates which sessions contain explicit suggestions for differentiating instruction to support or challenge students, as well as ideas on how to make instruction accessible to EL students. For example, a lesson might offer suggestions to scaffold instruction by having students share written observations with pictures and symbols as well as words.

Work Places, by their nature, offer excellent opportunities for differentiation. When a Work Place is introduced, the differentiation suggestions for the game or activity are included on the Work Place Guide. Support specific to ELs may refer to visual cues in the room. For example, a second grade beetle glyph Work Place (1E Match the Beetle) suggests that students use a posted legend as a visual reminder of the kinds of clues students will find. English learners might also be paired with peers who can help them to read and interpret clues.



Unit 1 Module 1 | **Session 1** *2 copies kept in clear plastic sleeves and stored in the Work Place bins*

Work Place Guide 1A Unifix Cubes

Summary

Students work independently to explore the Unifix cubes in an open-ended way. First graders enjoy snapping the cubes into long stacks, counting them, sorting them by color, and comparing the lengths of their stacks with other objects around the room.

Skills & Concepts

- Count to 120, starting with any number less than 120, including 0 or 1 (1.NBT.1)
- Group and count objects by tens (supports 1.NBT)
- Measure the length of an object by laying multiple copies of a shorter unit end to end (iterating) (1.MD.2)
- Look for and make use of structure (1.MP.7)

Materials

Copies	Kit Materials	Classroom Materials
TM T7 Work Place Guide 1A Unifix Cubes **TM T8** Work Place Instructions 1A Unifix Cubes		• 1000 Unifix cubes, 500 in each of 2 bins

Assessment & Differentiation

Here are some quick observational assessments you can make as students begin to play this game on their own. Use the results to differentiate as needed.

If you see that…	Differentiate	Example
A student cannot choose a place to work.	SUPPORT Ask the student to help you with your construction, or offer the student a choice of two Work Places, and help him make a decision.	
A student doesn't seem to know what to do with the cubes.	SUPPORT Encourage these students to watch what others are doing with the cubes. Ask questions that pique their interest, or add more structure to the task.	• What do you think you'll be able to do with the cubes? • Do you think you could snap them together in a train as long as your hand? Your foot? Your arm?
A student is unable to work productively with the cubes for longer than a few minutes.	SUPPORT Give the student a goal or a focus, or a set amount of time to work.	• Invite me back when you have made a train that is as long as the bookcase. • Let's set the timer for ten minutes, and when it goes off, you can go to another Work Place. • As inspiration, have the other students in the group describe what they are doing ("I'm making a pattern"; "We're seeing how long our train can get").
A student is having difficulty counting the cubes.	SUPPORT Encourage student to use these approaches: • Use one-to-one correspondence by touching each cube as it is counted. • Count the cubes aloud, slowly and deliberately.	
A student is very comfortable counting the cubes up to or past 100.	CHALLENGE Suggest these activities: • Estimate the length of a train in cubes, and then count to see. • Count the cubes by 2s. • Break a long train into 10s and 1s and count them by 10s and 1s. • Measure lengths of various items around the room with cubes.	• How long do you think your train is? • Can you count the cubes by 2s? • That's a lot of cubes. Can you think of a faster way to count them than by 1s? • Can you measure the length of the bookcase?
English-Language Learners Use the following adaptations to support the ELL students in your classroom.		
• Ask students to count a small number of cubes. Do they count in their first language or in English? If they count in their first language, count the cubes yourself in English. Can they repeat some of what you've said? • Help them with phrases like "How long?" and "How many?" by using body language as you ask the questions; e.g., stretch out your arm from the beginning to the end of the train for "How long?" or point to the first few cubes for "How many?"		

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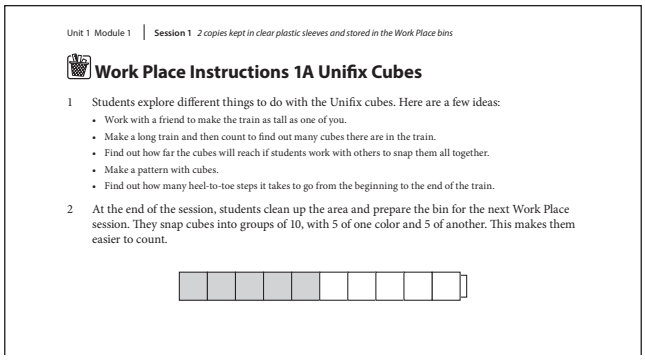

Unit 1 Module 1 | **Session 1** *2 copies kept in clear plastic sleeves and stored in the Work Place bins*

Work Place Instructions 1A Unifix Cubes

1 Students explore different things to do with the Unifix cubes. Here are a few ideas:
- Work with a friend to make the train as tall as one of you.
- Make a long train and then count to find out many cubes there are in the train.
- Find out how far the cubes will reach if students work with others to snap them all together.
- Make a pattern with cubes.
- Find out how many heel-to-toe steps it takes to go from the beginning to the end of the train.

2 At the end of the session, students clean up the area and prepare the bin for the next Work Place session. They snap cubes into groups of 10, with 5 of one color and 5 of another. This makes them easier to count.

As you consider the needs of EL students in the classroom, remember that many of the instructional practices mentioned here will benefit all students, not just those less proficient in English. Make Mathematical Practice standards an integral part of the learning environment, while holding all learners to a similar set of high expectations. As students adopt the behavior of mathematicians, they will find success.

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