Using High-Quality Instructional Materials to Support Language

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We worked to create rich language supports for rigorous, grade-level math tasks. The districts we partnered with already had high-quality curricula1 in place that included some language supports.

Language Supports Embedded in Bridges

The Bridges curriculum provides supports for teachers to help them make the curriculum accessible for MLL students. Each unit in Bridges starts out with a differentiation chart that highlights which lessons include suggested scaffolds for MLLs. These scaffolds are accompanied by sample student and teacher dialogue to illustrate how the scaffold may be implemented. The Bridges curriculum also provides teachers with materials to support MLLs in vocabulary development, such as illustrated word resource cards and Spanish-language materials. Students are given multiple opportunities to learn and practice new academic vocabulary, and they discover new ideas expressed in written and spoken language, visual models, and symbolic notation. They also use a wide variety of manipulatives to illustrate concepts and solve problems. They are encouraged to solve problems and demonstrate what they know and can do using any combination of pictures, words, and symbolic notation, including numbers and operational symbols.

Language Supports Embedded in IM K-12 Math

Illustrative Mathematics or IM K-12 Math provides MLL support in their curriculum. The MLL supports were designed by the Understanding Language team at the Stanford Center for Assessment, Learning and Equity (UL/SCALE). IM K- 12 Math makes use of 8 Mathematical Language Routines (MLRs) throughout the curriculum. These MLRs are similar to instructional routines in that they structure student interactions but also provide an additional focus on language development. To make the MLRs more accessible to teachers, IM K-12 Math includes descriptions for each routine in the teacher guide and includes a step-by-step description of "how it happens." To help teachers learn the routines, an extended description of the support is included the first time each MLR appears in a course. In the teacher's guide, IM K-12 Math includes additional supports such as sentence frames, information about how students will use language in the unit, and vocabulary tables that are broken up into receptive and productive language. Students have access to an illustrated glossary to help them make sense of new vocabulary.

Language Supports Embedded in Eureka Math

The Eureka Math uses the principles of Universal Design for Learning to provide supports for teachers to help them make the curriculum accessible for MLL students. Eureka Math includes strategically placed margin notes detailing specific scaffolds that teachers can use. The scaffolds support teachers in both receptive and productive language considerations. Eureka Math also provides guides for introducing language and supports such as pre-made anchor charts that embed vocabulary support, illustrated word wall resources, and sentence stems to support productive language. In Eureka Math, new terminology is introduced informally in context and then clarified within the same lesson or in a subsequent lesson or grade level. Students have multiple opportunities to hear and use new terminology both in lessons and in their practice.

[1] For the purposes of this work, we consider "high-quality" curricula to be curricula earning a green rating from edreports.org.

Additional Supports for MLL Good to Great

TNTP built off the supports provided in the curriculum to create math lessons that were accessible to all students. The supports that TNTP added during the MLL Good to Great intensive included using protocols with teachers to help them identify the receptive and productive language demands in each lesson and utilizing Math Language Routines to enrich the curricular lessons. TNTP's MLL Good to Great intensive includes explicit language focused reflections during the planning and debrief conversations. These components of MLL Good to Great allowed teachers the opportunity to think deeply about how they support and position their MLL students.

To do this, TNTP first assessed the linguistic demand of both the mathematics and the task itself. We provided visuals and productive language supports, and we walked teachers through the process for creating these so they could replicate this process on their own. We also provided protocols and supports to aid students in engaging in authentic math discussions.

First, we worked with our district partners to identify focus standards for each grade level and then examined the curriculum scope and sequence to determine which units and modules covered those focus standards. We then scanned the curriculum for challenging word problems, and we selected problems that had mathematical challenges as well as complex language. Collaborative planning is a key feature of MLL Good to Great, and we met daily to plan with teachers. During this planning process, we would collaboratively analyze the language of the problem to determine what academic language students should know in order to engage with this problem as well as what support students might need to fully understand the language of the problem. TNTP coaches would provide some example visuals, and the teachers would suggest others that might benefit their students. Finally, we planned for what language students would need to use to communicate their answers.

We used Math Language Routines to promote mathematical discourse. We reviewed the Three Reads Protocol as well as the Stronger and Clearer Each Time Protocol. In addition, TNTP coaches would model these strategies and then debrief them with the teachers. TNTP would also show videos of the strategies being used in classes, so teachers had several chances to see the strategies in use. During planning time, we would create differentiated sentence stems for students to use to support language production. Teachers then had time to practice implementing these strategies with their peers. Teachers were able to study several exemplars, practice with peers, and receive feedback before they implemented the strategies in the classroom.

During instruction, teachers engaged students in mathematical discourse each day. They began each day with a warm-up activity, typically a Number Talk or Problem String. Students analyzed the patterns presented in various problems and discussed possible connections and predictions with their classmates. Teachers would then introduce a new task using the Three Reads Protocol, and they would also provide any visuals or supports for the problem. As students began discussing the protocol, teachers provided sentence stems to support their discourse. Students had multiple opportunities to speak with partners and to process their mathematical understanding.

After the Three Reads was complete and students completed the task independently, TNTP coaches met with teachers to analyze student work. Teachers looked at the mathematical understanding as well as the linguistic expression to determine student learning and identify any trends. Teachers then selected and sequenced student work, and this required them to identify solutions that they wanted students to share and discuss with the class the next day. This allowed teachers to address any common misconceptions, and it gave them a chance to highlight different students' as mathematically capable. When students presented, they were able to express their mathematical understanding and address clarifying questions from their classmates. Sometimes students would realize they needed to make a correction, and they would show the class how they corrected their answer.

Once the presentation of student work was complete, the teacher would identify a conceptual understanding that students need to master and this would be used to create a prompt for Stronger and Clearer Each Time. For example, 4th grade teachers asked students how they could use what they knew about place value to solve 3-digit multiplication problems. Students had time to craft a response independently, and the teacher provided sentence stems to get them started as needed. Students then shared their responses with a

classmate and listened to the classmate's response in turn. The students conversed about math and clarified their thinking. Students took notes on what their classmates said, and they could incorporate this into their answer. Students then completed one or two more rotations with new partners. Once the students had shared their responses and had written any notes they wanted to add into their answers, they then had the opportunity to return to their seats and rewrite their answers incorporating the feedback and new ideas they wanted to include. Their responses become stronger and clearer with each round of sharing.