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Interactive Technologies in STEM Teaching and Learning



Supporting Mathematics Discourse with Sentence Starters & Sentence Frames

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Purpose

Ms. Knight uses sentence starters and sentence frames with her grade 2 students to support the development of rich mathematics communication and critique.

How do they work?

Students are given partial sentences to complete with their own words. For example, students may be given the start of a sentence to use during a class discussion, such as, "I liked when you..." Or, students may have a list of sentence frames for which they need to fill in the blank(s) with numbers or words while they explain their problem solving process.

Background

To support the development of rich student math talk in the classroom, students need help learning and using academic language structures, practicing communication and critique, and building understanding of academic vocabulary through use in context (Scarcella, 1996; Schleppegrell, 2002). Their experiences should help them bridge from the informal speech that they bring to the classroom to a rich discourse that incorporates the academic language of mathematics. Students must do more than just use mathematics vocabulary, since vocabulary can often be used without understanding. Students must engage in discourse that is connected to their thinking about the math with which they are engaged and that supports deeper understanding. The language relative to academic content is quite different from everyday conversations.

Academic language refers to the specialized vocabulary, grammar, discourse/textual, and functional skills associated with academic instruction and mastery of academic material and tasks. (Saunders, Goldenberg, and Marcelletti, 2013)

The use of sentence starters and frames help students develop academic language by providing grammar and syntax structures for mathematical discourse that students can use and learn. Teachers need to make academic language expectations explicit (Fillmore and Snow, 2000) and "one efficient way to get students to apply academic language is to

provide opportunities for ‘prepared participation,’ which affords them time to collect their thoughts” (Feldman and Kinsella, 2005). Sentence starters and frames help provide these opportunities and can be used to support student explanation, develop skills for peer critique, scaffold group or class dialogue, and be used to engage with mathematics vocabulary and math-specific word meanings in context. They can also be used more broadly for student reflection and in other content areas.

Ms. Knight used a variety of sentence starters and frames with her students, starting with sentence frames that support student explanations of a procedure or their problem solving process. Sentence starters such as, “The first thing I did to solve the problem was...” can help students—including students who normally speak little or not at all in math class—talk more about their work. Although many sentence frames Ms. Knight used with students were applicable to a wide variety of problems and lessons, some were tailored for specific tasks or strategies. A few examples are given in the box in the upper right of this page.

Sentence starters and frames can also provide structure to elicit and deepen student understanding. For example, the sentence starters, “I discovered that...” and, “I knew my answer was reasonable because ...” prompt students to think deeply about specific aspects of their problem solving process while providing a structure for talking about it. Examples of sentence starters that Ms. Knight used with her students to elicit and deepen their thinking are in the second box on the right.

In addition to sentence starters and frames that support students in sharing and thinking deeply about their own work, different types of sentence starters and frames can support peer discussion and peer critique of mathematics problem-solving. For example, sentence starters such as, “Can you explain how you...” and, “I wonder why you...” help students engage with their peers and extend their mathematics dialogue. When students use sentence starters and frames such as, “Can you tell me how you knew...?” and, “What does the ____ in your drawing represent?”, they are reinforcing the importance of clear explanations and the use of visual representations for themselves and their peers.

Ms. Knight supported peer critique by using sentence starters and frames like the examples in the third box from the top. In addition, she used questions similar to those in the bottom box to probe student thinking and support peer critique in classroom discussions and group work.

Sentence Starters and Frames To Develop Language Structure

Generic sentence starters

You can see my strategy on this [number line/ten frame].

I started by...

First, I... Next, I... Finally, I...

Sentence frames for a specific task using a counting up through 10 strategy for subtraction

I started at ____ and counted up to 10.

That was ____ jumps of ____.

Then I counted to ____.

That was ____ jump of ____.

Then I added my jumps to get ____.

So, ____ - ____ = ____.

Sentence Starters and Frames To Elicit & Deepen Student Thinking

I know the answer is reasonable/correct because...

The first thing I did to solve the problem was...

I can check my answer by...

I proved my thinking by...

The strategy I used was...

I discovered that...

I noticed that...

I wonder...

Sentence Starters and Frames for Peer Critique

I agree/disagree with you because...

Can you tell me how you knew...

Can you explain how/why you...

What you did is similar to...

Did you think about...

I hear you say that...

I wonder how/why you...

I liked when you ...

Sentence Frames for Educators to Support Student Critique

Do you agree or disagree with ____ and why?

How is that different from what ____ did?

How is that the same as what ____ did?

Explain what ____ just said.

Why do you think ____?

Resources

Interactive Stem: Supporting Mathematical Discourse in the Early Grades

Education Development Center, 2015

<http://interactivestem.org/briefs/research-brief-supporting-mathematical-discourse-in-the-early-grades.html>

Math Talk Sentence Starters

Wilford, K., 2016

http://misswilford.weebly.com/uploads/2/3/2/6/23261446/math_talk_sentence_starters.pdf

MathSolutions Video: Math Talk in Action - 1st Grader

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<https://mathsolutions.wistia.com/medias/3a076b2e4a>

Source: Anderson, N.C., Chapin, S. H., & O'Connor, C., 2011

Classroom Discussions in Math: A Facilitator's Guide to Support Professional Learning of Discourse and the Common Core, Grades K–6: A Multimedia Professional Learning Resource

Inside Mathematics Video: Number Talk: 1st Grade Math - Quick Look With Ten Frames

© 1997–2016, the Charles A. Dana Center at The University of Texas at Austin; featuring O'Neill, L.

<http://www.insidemathematics.org/classroom-videos/number-talks/1st-grade-math-quick-look-with-ten-frames/number-talk>

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