The Mathematical Practices are here, and it is our job to encourage verbal interaction among our students, interaction focused on the math unit under study. We are also tasked with including all students, even students whose reticence to speak out in class is not easily reversed. We need a series of activities that might make it easier for these students to take part in discussions — math talks — in which participants practice the habit of thinking out loud about a math concept. Here are some suggestions.

Start the most reticent students together, and apart from the larger group

Although you enthusiastically signed up for the differentiation professional development workshops, your students learning English still aren’t speaking out in your mainstream classroom. It sounds simplistic, but if we put ourselves in their position we might not readily make academic contributions to a math talk. “Oracy,” or the oral component of school language, requires more than competent examples and sensitive, friendly classmates. It requires practice, so separate reticent students and guide their practice apart from the rest of the class.

Give students their words

Select several students who are not likely to contribute to the discussion. Give each a slip of paper with a question or comment such as:

- Can you explain that in a different way?
- Can someone else explain that in a different way?
- Can you draw that on the board?
- What else can you say about that?
- I like the way you explained that.
- Now I understand better.

Practice these comments with the students. Call on these students at an opportune moment during the math talk to read the question on their slip of paper.

Give students some of their words

Offer reluctant speakers slips of paper with partial comments or questions to read when called upon. Some examples:

“I think _____ belongs between _____ and _____ on the number line.”

“Who can name a number that does not go between _____ and _____ on this number line?”

Allow, even insist on, students bringing a calculator to the math talk.

For students who do not routinely speak out, and whose math skills might be weak, the first step in a math talk is the talking, not the math. These students are more willing to volunteer when they perceive the math as simple and accessible, even if it is not. Here is an example from a recent math talk in an Oregon classroom.

Students were told that the math talk topic was fractions and decimals. The teacher posted a surgery schedule from a recent hospitalization:

- Trip to the hospital: 15 minutes
- Walk from the parking lot to the building: 5 minutes
- Registration: 10 minutes
- Preparation for surgery: 75 minutes

As the teacher read and pointed to each line in the schedule, students were busy doing what students do when they see numbers. They were adding. When it came time to start the math talk, the noise level and enthusiasm had risen to a level unprecedented among this group of students. As they went around the math talk horseshoe, the students announced the total number of minutes they had derived from adding each schedule entry. Students had not related the data to the fraction/decimal topic under discussion in the math classroom, but they had generated enthusiasm not seen before in this group. We are supposed to be teaching to a single, discreet objective. Even though their talk ignored the math objective, the students were responding; they were “math talking.” During the seatwork that followed, students rewrote the fractions as decimals.

Continued...
Force the topics you expect to cover

In the previous example, students’ enthusiasm was great, but the math was very limited. In order to increase the math, the teacher repeated the hospital example, substituting fractions for minutes, i.e., \(\frac{15}{60}\) of an hour, \(\frac{5}{60}\) of an hour…. Students who knew how to add fractions with identical denominators again shouted to be the first to announce the improper fraction they had derived from simply adding numerators. During the seatwork that followed, students found equivalent fractions and rewrote the fractions as decimals.

Repeat the math until the talk starts to flow

The day after the surgery example, students worked a similar example for the math class, even including the same numbers:

- Check homework and ask questions — 15 minutes.
- Open notebooks and set up the page for today’s lesson — 5 minutes
  (etc.)

During the seatwork that followed, students repeated the fractions exercise and rewrote the fractions as decimals.

Move English learners to the mainstream group, with great support

What kind of support can a teacher provide? Give students slips of paper with questions to read. Some examples:

- Can someone explain that another way?
- Who else used the same procedure?
- Did someone do it a different way?

Ask an English proficient student, as they finish their contribution, to call on an English learner to read from the slip of paper.

Although English learners will make some advances while learning how to perform during a math talk among themselves, there may be very slow progress when they are expected to do the same in the mainstream classroom.

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Helping Elementary Students to Better Understand the Mathematical Practices

by Jackie Cooke, Elementary Math Facilitator for MESD

Elementary school is a critical time for learning to think mathematically because it is when students build foundational number sense and critical reasoning habits that will help them comprehend increasingly complex mathematical concepts. The Practice Standards describe the kind of math teaching and learning that will produce the most successful learning and that will help students dig deeper and better understand math.

The following quote summarizes what implementation of the Practice Standards looks like in the classroom:

“With respect to instruction, implementing CCSSM’s Standards for Mathematical Practice will call for engaging students much more in such processes as —

- problem solving;
- communication of mathematical ideas in meaningful classroom discourse;
- making connections across topics and to contexts;
- reasoning about and justifying solutions;
- developing a positive disposition toward mathematics;
- creating and sharing multiple representations of mathematical concepts and procedures; and
- modeling mathematical processes.”

From “NCTM Summing Up”, May 2011
Written by former NCTM President, J. Michael Shaughnessy

The important point here is that students are learning to use tools or models to prove or solve something mathematically, communicate effective-