# The Main Idea's PD Suggestions for *Accessible Mathematics*

## How Teachers Can Learn & Use the 10 Instructional Shifts

→ Have your math teachers plan "mini-PDs" to introduce each instructional shift

Below is a plan to introduce the 10 shifts to your math teachers in a way that truly invests them in the process. Each math teacher will introduce 1-2 strategies to the group each week or each math department meeting. After reading the appropriate chapter(s), each math teacher will design a "mini-PD" for the group. Below is a structure they can use for presenting the shift:

A. MODEL – The presenter will teach a math problem/concept to the other math teachers (who will actually *do* the math as if they were students) so they can understand how working this way is *different* from a traditional approach.

B. DISCUSS – The presenter will ask the math teachers what they experienced in completing this math task. Then s/he will introduce the rationale for this different instructional approach and discuss it further.

C. PLAN – The rest of the time will be for the math teachers, alone or in grade-level groups, to write similar problems or questions they can use in their own classrooms.

→ The principal or math leader models a sample "mini-PD" using the MODEL, DISCUSS, PLAN approach

A math leader can introduce the first instructional shift to the math teachers using the above approach. Below is an example of this.

***Instructional Shift #5: Build number sense***

A. MODEL – Have the following question on the board, tell the other math teachers that it is a question on a test (perhaps high-stakes), and ask them to imagine they are students and to please solve the problem. (Note this problem comes directly from the chapter. The presenter should feel free to use the actual problems from the chapter.)

| Tom has $10.00 and sandwiches cost $1.89 each. What is the greatest number of sandwiches that Tom can buy? |
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| a. 5 b. 8 c. 11 d. 18 |

B. DISCUSS – Ask the math teachers to share how they solved this problem with the group. Some teachers will explain that they divided 10.00 by 1.89 and got approximately 5.291 so they knew the answer was 'a'. Hopefully some teachers will explain that $1.89 is just a bit less than $2.00 so they didn't have to work out the problem and figured it was 'a'. If not, the presenter would introduce this option and explain that we focus too much on teaching *procedures* in our math instruction and have to help our students develop *number sense.* Perhaps put the definition on the board, "Number sense is a comfort with numbers that includes facility with estimation, mental math, numerical equivalents, a sense of order and size, and a deep understanding of place value." Emphasize that the development of number sense in our students should be one of the key goals of our math curriculum. Explain that to include number sense in our curriculum, often all we have to do is to get into the habit of pausing in our teaching and ask questions like:

- Which is the greatest or smallest? (Size and place value) How do you know?
- What is 10 or 100 more than that number? What is 10 or 100 times that number? What is a tenth less? (Place value)
- What else can you tell me about those numbers?
- How else can we express that number? (As a decimal? Mixed number? Numerical equivalents) Is there still another way?
- About how much would that be? (Estimation or Rounding) How did you get that?

C. PLAN – For their next lesson plan, have the teachers either create math questions that get their students to focus on number sense (Such as a series of problems that focus on a number sense skill such as estimation. They could assign a set of subtraction problems like 1629 - 95 or percent problems like 50% of $23.85 – that they ONLY use estimation to solve.) Or, they can use their regular math problems, but write a series of number sense follow-up questions to use with the problems that they write into their lesson plan for tomorrow. Use the questions above for guidance. For example, if they know that the answer to a math problem they are teaching tomorrow is 25.925, they can write these questions into their lesson plan:

- Is this to the left or right of 25 on a number line?
- Is it closer to 25 or 26? Why?
- What's a tenth *less* than this number? How did you figure that out?

NOTE: the above workshop format does *not* apply to Instructional Shift #8 which asks teachers to cut topics from the curriculum that we no longer need to teach. That's a larger topic the principal/instructional leader should introduce over the summer.

NOTE: Some of the shifts are harder than others, so perhaps you should give these to more experienced teachers.

→ Make it Stick – help teachers remember to use the new instructional shifts after all have been introduced

One idea to keep these ideas present your teachers' minds is for them to create a poster, to hang in their rooms, of the kinds of follow-up questions to always ask in class. Each teacher can choose the type of questions s/he personally is more likely to forget to ask:

- Is there a different answer? (more than one answer)
- Can you justify that? (ask why/moving beyond right answers)
- Can you draw that? (different representations)
- Is that a reasonable answer? (number sense)
- What does that word mean? (math vocabulary)
- How else can you display the data? (milk the data)
- Where does this math come up in real life? (context)
- How big/heavy/long/wide is that? (measurement)

Another idea to keep these ideas present in your teachers' minds is to have teachers create a *lesson plan checklist* of the shifts that they staple to the lesson plan (or simply refer to) to make sure they include the shifts. They can use the following or create their own:

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| ❒ cumulative review | ❒ higher-order thinking, ask why | ❒ have students visualize, draw, model | ❒ real-world contexts |
| ❒ math vocabulary | ❒ milk the data | ❒ incorporate measurement | ❒ number sense |