FROM THE EDITOR -

Beginning in May of 2014, we began asking readers *of PD News You Can Use* if they had educational questions that our community-at-large might be able to help answer. We've received several questions and, with the August 2014 issue, we began posting selected questions. I'm happy to say that we've received numerous in-depth and thoughtful suggestions. Welcome to the first issue of *Questions and Answers* from *PD News You Can Use* where we share responses to a question about younger students and problem-solving.

ON DECEMBER 2, 2014, DAVID ASKED -

We want students to gain experience with problem solving. How do we assess the process done by elementary school students? Many times they are frustrated when we insist they keep records of their work; young students think much faster than they can record their thoughts. How do we show parents the process the student underwent — alone or with others — to solve the problem? How do we guide parents to appreciate the problem-solving process, not just the answer to the problem?

Melissa Answered -

I like to use graphic organizers [UPS check or Star Model for word problems] to help children become productive problem solvers, but I have also found that they help parents see that the solution pathway can be as important as the solution itself. I like to explain that the pathway uncovers how deeply the student understands the concept, and it also uncovers the misconception that causes the error. It's like discovering the illness that is causing the stuffy nose, rather than just focusing on the stuffy nose.

D.B. Answered -

One way to help formalize student thinking (and thus be able to have students show their thinking) is to teach different problem solving techniques (and the image to go with them). Students then write down which one(s) they used and how it helped or didn't. For group work, this includes students explaining what their thinking was (make a model, make a table or list, look for a pattern, guess and check, etc.).

Dave Answered -

In the 1980's several others at my school asked me why I always followed a second-grader student answer with the question "why?" It was to check on their knowledge of facts and reasoning. If students at lower grades are not proficient at writing the reasoning, it is still useful to discuss it, and to have other students restate it. If a student is not paying attention to the first student, they may be attentive when another student restates it. Often students state it in a way they understand better than the teacher's approach.

Julie Answered -

At the beginning of the year, I always told my parents that although students needed to know how to correctly perform various operations in math, I'd never been asked by my supervisors (in the aerospace industry) to complete and turn in all the odd problems on page 204 by the end of the day. Instead, I'd be called in and told about a problem that needed to be solved, and I was expected to return at the end of the day with 3 solutions. Did I need to use math? Most likely. But more importantly, I needed to be able to *apply* the math knowledge I had to solve a 'real life' problem.

We need to design Curriculum Nights or Math Nights where parents are not only introduced to CC standards but also to the Mathematical Practices, and then demonstrate how those two areas of Common Core dovetail in every lesson. Providing 'centers' where parents and children can work through various problem-solving experiences with classroom teachers or support staff talking about the math while their doing the math would help parents understand what their child is being expected to accomplish in school.

Toni Answered -

Teach the students to use visuals, such as Ten Frames. Use them often and have students always fill in left to right. Another regular visual students should use is the bar diagram. It should show the relationship "part-part-whole." The language of part-part-whole should be in regular use in the classroom. In writing and explaining their answers, students should use blank white paper and pens or markers. Teach them to cross out rather than erase. This allows the viewer to see the student's thinking. Teacher modeling will get students used to this new process.

Mike Answered -

Young students can't really think as fast as they would believe. One of the reasons we ask them to show steps is to force them to slow down and give better

outputs. We give no rewards for being first done (at least, I'd hope not). Three drafts of a paper? ... each one should be an improvement on the previous. Show 'em to the parents. Showing their work in math? ... we AND THEY can see where they are making errors. Show samples to the parents. Formulating an opinion or taking a stance? ... they must show the evidence from which they formed that opinion. Have them document it and it can be shown to the parents.

Dean Answered -

The advantages of reflective thought in gaining an "understanding" of the rules at play in problem solving (which aren't typically "see-able" anyway), and not just an accounting of the see-able features/aspects of the problem, has had many an educator wanting to formalize that process (metacognition). Record keeping in all its forms is a benefit as seen by those who already know how to solve the problem and is simply not recognizable (yet) as a benefit to those still trying to figure out what is going on. Ask yourself about the usefulness of taking a bunch of record keeping steps if it turns out that the thing you "figured out" wasn't the answer? As simple as this sounds, you might want to include a record keeping device handy (hopefully video is readily available) to act like the "Black Box". By doing this you can engage in "think out loud" problem solving which generates reflection without always demanding an administrative step.

Robert Answered -

Teach your students the Singapore Bar Modeling process which allows them to see the relationship between the numbers and figure out what to do based on the model. Excellent materials on this are available from SDE.com. Singapore bar modeling is an excellent pre-algebraic pictorial model which allows students to do algebraic thinking without the abstract symbol manipulation that algebra requires.