BUILD MATH minds

THE PODCAST with Christina Tondevold

Welcome fellow Recovering Traditionalists to Episode 164: The Power of Using Inverse Operations to Subtract & Divide

Before we get into the episode, this week's positivity comes from the Build Math Minds Facebook group again. As of today we have over 76,000 people in that group. It is a place to ask questions about the teaching and learning of math and to ask advice for activities to get your students engaged with mathematics. Ann Elise Record manages the group for me and she does a great job of kicking out the spammers. No one's allowed to post about their product. They can suggest it in the comments if it fits with what people are asking about, but the group is meant for educators to crowdsource answers to their questions. In this post by Tracey, she was looking to get advice from other educators who had 'defronted' their classrooms. I decided to share this because I love to see educators helping other educators.

Often in schools we are afraid to ask for advice with the others in our building because it's hard to put yourself out there or you might be in a school where no other teachers are trying to teach math the way you are. I'm so thankful that the Build Math Minds group is a place where educators feel safe to ask their questions and seek out advice.

If you aren't a part of the Build Math Minds Facebook group you can join by going to
https://www.facebook.com/groups/BuildMathMinds

Next weekend, on April 14, is our Math Strategy Session where Rosalba Serrano will be exploring how to help kids develop & use the Inverse Operation strategy. Since December, we've been hosting live sessions that explore the main 4 strategies kids need to develop and use for Addition, Subtraction, Multiplication, and Division. We only have the Inverse Operations strategy session left and then in May Rosalba is doing a final session that wraps up the whole series. If you haven't registered for the sessions, you still have time to join us just go to
https://buildmathminds.com/strategy-sessions and I'll also link that on the show notes page at
buildmathminds.com/164.

Since we are exploring the Inverse Operation strategy, I thought I'd share with you one of the first books that brought this idea to my attention. Inverse Operation Strategy is when you use the inverse operation to solve the problem. For example when you see 15-9, if you think "what plus 9 would make 15" you are doing the inverse operation…you are using addition to solve a subtraction problem.

Now some of you may be wondering why it took me reading a book to know about this strategy, but I'll remind you that I was a rule-following child and so I only solved problems the way my teachers taught me to. When we were doing subtraction, we used addition but it was ONLY to check our work. After we solved a subtraction problem, we were told to then add that answer back to the bottom number so that we could make sure our answer was correct. We were never shown (a) why that works or (b) that you could use addition to actually solve the problem.

In the book Mastering the Basic Math Facts in Multiplication and Division by Susan O'Connell and John SanGiovanni, each chapter focuses on a type of multiplication fact and in every chapter they have a section about connecting it to Division (they have the same thing for Subtraction in the Addition & Subtraction book).

When I was in school I learned my multiplication facts and then later learned the division facts. They were not connected. These books, published in 2011, were the first ones I'd seen that really emphasized the connection between the inverse operations. The books are focused on helping kids master addition and multiplication but while doing that, they encourage teachers to help students build the connection between addition-subtraction and multiplication-division.

In the first chapter where they start talking about the types of multiplication facts (which is actually Chapter 2: Multiplying by 2) the section about Connecting to Division, on page 41, states

"As students develop an understanding of multiplication with 2 as a factor, take every opportunity to talk about the connection between multiplication and division facts. Students might be asked to talk about the similarities and differences between the following equations:

$$2 \times 5 = 10 \qquad 10 \div 2 = 5$$

Students might focus on the similarities in the numbers in each equation (e.g., "They both have a 2, 5, and 10 in them."). They might state that they are part of a fact family, but pose questions that require students to delve more deeply into their thinking and explain their understanding of the equations. Colleen observed that "if you have 2 groups of 5 you get 10, but if you have 10 and split it into 2 groups, there's 5 in each group." Megan added, "2 x 5 is double 5, but 10 ÷ 2 is splitting 10 in half."

You might provide manipulatives so students can show the operations as they discuss their ideas or have the class act out equations. Exploring the connections between the operations will help strengthen students' problem-solving skills as they deepen their understanding of the equations. Once students have a firm understanding of inverse operations and have gained fluency with their multiplication facts, they will be empowered by their expanded repertoire of division facts, too."

Then in the next chapter about Multiplying by 10, there is a Tip on page 53:

"It is important for students to understand the concepts of multiplication and division; however, when the focus is on math fact fluency, remind students to *think multiplication*. Mastering multiplication facts and exploring fact families support students' mastery of division facts."

Throughout the book, they remind the reader that the job is to help students build their understanding of the concepts of multiplication & division, how those connect together and help kids with their mastery of the facts. But building the connections between inverse operations isn't just for facts. This idea helps students as they progress through all their work with Addition, Subtraction, Multiplication, and Division.

When students are working on a problem like 2049 - 1782, it might be easier for them to 'think addition' and start at 1782 and add up to 2049. And when they are doing division, especially long division, it is all about multiplication. All the strategies for division are heavily dependent on students being fluent with multiplication. So no matter what grade level you teach, spend time helping your students build the connection between the inverse operations. If you need help with that, the books help you for the basic math facts, but if you want to see how to help kids at all the

elementary levels get registered to join us for our Strategy Session on April 14th that explores the Inverse Operations Strategy. Go to https://buildmathminds.com/strategy-sessions and I'll email you the link to join us.

Until next week my Fellow Recovering Traditionalists, keep Building Math Minds.

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