Welcome fellow Recovering Traditionalists to Episode 145. Today we're taking a look at how Math Textbooks Have the Teaching of Fluency All Wrong.

In the last episode of the podcast, I shared the three ideas that make up computational fluency: Efficiency, Accuracy, and Flexibility.

Flexibility is often the piece that is missing in our fluency instruction, but recently textbooks have tried to incorporate more of it, but in the wrong way.

They have put in lessons teaching students *all* the different strategies to do computations. Textbooks now have 5 different ways you have to teach your students to solve addition problems, six different ways to solve subtraction problems and so on.

Instead of building their flexibility, it often just confuses kids.

In the book Principles to Actions: Ensuring Mathematical Success For All by The National Council of Teachers of Mathematics, they have an entire chapter about building Procedural Fluency from Conceptual Understanding.

On page 42 it says:
"Fluency is not a simple idea. Being fluent means that students are able to choose flexibly among methods and strategies to solve contextual and mathematical problems, they understand and are able to explain their approaches, and they are able to produce accurate answers efficiently. Fluency builds from initial exploration and discussion of number concepts to using informal reasoning strategies based on meanings and properties of the operations to the eventual use of general methods as tools in solving problems. This sequence is beneficial whether students are building toward fluency with single- and multi-digit computation with whole numbers or fluency with, for example, fraction operations, proportional relationships, measurement formulas, or algebraic procedures.

Computational fluency is strongly related to number sense and involves so much more than the conventional view of it encompasses. Developing students' computational fluency extends far beyond having students memorize facts or a series of steps unconnected to understanding (Baroody 2006; Griffin 2005)."

On page 46 they go on to explain that *"effective teaching not only acknowledges the importance of both conceptual understanding and procedural fluency but also ensures that the learning of procedures is developed over time, on a strong foundation of understanding and the use of student-generated strategies in solving problems. This approach supports students in developing the ability to understand and explain their use of procedures, choose flexibly among methods, and strategies to solve contextual and mathematical problems, and produce accurate answers efficiently."*

I'd like to dive in a bit deeper to this part:

> *Fluency builds from initial exploration and discussion of number concepts to using informal reasoning strategies based on meanings and properties of the operations to the eventual use of general methods as tools in solving problems.*

Most textbooks jump straight to the end of that. They try to teach students the general methods for solving problems, but they haven't let students explore number concepts or build their own informal reasoning strategies. The textbooks jump to the formal version of the strategies yet kids haven't built their understanding of numbers in order to fully make sense of the strategies.

They say "*the learning of procedures is developed over time, on a strong foundation of understanding and the use of student-generated strategies in solving problems".* Three key parts in this:

1. **Procedures develop over time** *(not one or two lessons in a textbook)*
2. **They need a strong foundation of understanding** *(they need to understand how numbers work, aka build their Number Sense)*
3. **Strategies should be student-generated** *(When we directly teach strategies to students, they get confused by all of them. But when students generate their own strategies it's because the strategies actually make sense to them.)*

Procedural Fluency can't be done in just one or two lessons in a textbook for each of the different strategies.

We need to allow children time to explore and build their informal strategies.

We need to put more focus on developing number sense.

We need to let students solve problems in a way that makes sense to them, not let the textbook tell them they must solve it using a particular strategy.

All three of these ideas are things we talk about inside my online PD courses for elementary teachers, The Flexibility Formula.

Most of the course is on how to help kids develop number sense, but we do address ways to allow more exploration and building of informal strategies and ways to modify your textbook.

The Flexibility Formula K-2 is all about building number sense around the numbers 0-20 and then how that expands into helping kids build a sense of numbers beyond 20.

In The Flexibility Formula 3-5 we look at how to build number sense in a way that builds flexible problem solvers for multiplication & division, multi-digit addition & subtraction, and fractions.

If you are wanting to build your students' fluency by focusing on developing their number sense, because as the book said "*Computational fluency is strongly related to number sense"*, enroll in The Flexibility Formula. Go to buildmathminds.com/enroll and you can click on either the K-2 or the 3-5 class to get information and enroll in the course.

I'll link the courses over on the show notes page, buildmathminds.com/145, along with the book Principles to Actions. That book is one of my 'must-have' books if you teach mathematics.

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

These episodes are sponsored by the online trainings that I do for elementary educators. Registration for The Flexibility Formula K-2 and 3rd-5th is now open. These courses help you understand the foundation of number sense, how number sense builds kids' flexibility with numbers, and how that impacts their ability to become fluent with the mathematics at your grade level. Go to buildmathminds.com/enroll to learn more about each course and get enrolled.