



Automaticity Tidbit # 3 Making Sense of Number Sense

Common Thread- Number Sense is **IMPERATIVE** to Mathematical Success

WTHNS-What the ‘Heck’ is Number Sense? Decades ago I was enthusiastically involved in a parent conference discussing their child’s math ability. “ Billy just doesn’t have number sense and so math is difficult for him.” The parents responded, “What is number sense? “ I replied, You know, he doesn’t have a sense of number.” and I proceeded with the conference. Truth be known, I had no clue how to answer the question. Truth be known, I was anxious about math and my professional time was spent with researching reading and writing. If you are anxious about something, you go to the comfort zone of teaching the way your were taught. That was drill and kill, and procedures without understanding for me. I should have known better since my language arts’ instruction was changing and being taught using best practice backed by research. So, sorry to all of the students I probably turned off to math.... and, you are welcome to those students I later taught. They began to love math, because of my efforts to research and attain a new understanding of math. Math became fun, exciting, and a time to persevere!

There are three main reasons why students are not automatic with their facts.

1. Over reliance on counting—-when thinking gets tough we go back to what is easy.

2. Students lack number sense-they need time to explore and talk about numbers, before they are asked to compute numbers.

3. The manipulatives they use force kids to count one-by-one.

We know the answers, but why do the children in the US still lag behind other countries in math?

Let’s focus on number sense. Number Sense is complex. It begins to develop in an individual way at birth that largely depends on the environment in which the child grows up. The environment needs to connect with the world in which young children live, and with their natural curiosity and inquisitiveness. Number Sense is rooted within all strands of mathematics. It facilitates problem solving, reasoning, and discussion of mathematical ideas. According to John Van de

Walle, Number Sense means that you think about and use numbers and their relationships in multiple ways to estimate and solve problems. Research indicates that early number sense predicts school success more than other measures of cognition, such as verbal, spatial, memory skills, or reading ability! Therefore, the importance of young children developing strong number sense cannot be overstated. Howden defines number sense as ‘**good intuition**’ about numbers and their relationships. It develops gradually as a result of exploring numbers, visualizing them in a variety of contexts, and retaining them in ways that are not limited by traditional algorithms. Hence, kids are building connections around numbers. Number Sense includes using different strategies for figuring out facts using properties like commutativity to reduce the number of facts to be learned, and generally look to use patterns and relations. (No More Fact Frenzy) The most important thing teachers can do for children is to help them discover all of the interconnections rather than learning a particular strategy or problem-solving approach. A deep understanding of number relationships will equip children with the foundation they need to invent and comprehend all kinds of problem solutions later. Finally, Sherry Parrish defines number sense as an awareness and understanding about what numbers are, their relationships, their magnitude, the relative effect of operation on numbers, including the use of mental mathematics and estimation. When you elicit answers to a problem and ask students to share whether the answer is **reasonable** you are helping build number sense.

So what does that mean? Here is an example from Cathy Fosnot:
Algorithms versus number sense—- Solve the problem $3,996 + 4,246$. If you do as most people, who are products of American schools, you probably got a pencil and paper, rewrote the numbers over in columns, added the units and carried, then added each remaining column, right to left. You used the ‘carrying’ algorithm—the procedures you were taught in school, If you **didn’t**...you probably have number sense. Calculating with number sense means that one must look at the numbers first and then decide on a strategy that is fitting and efficient. Children who learn to think, rather than to apply the same procedures by rote, regardless of the numbers, will be empowered. We are asking children to learn more and to mathematize, to think like mathematicians, to look at the numbers before they calculate, to think rather than to perform rote procedures. That is possessing NUMBER SENSE!

To get to this point many teachers, according to Cathy Fosnot, will need support. Learning to teach in a way that supports mathematizing—in a way that supports calculating with number sense— takes time. We need to make that time. Number Sense, is critically important to students' mathematical development and is inhibited by over-emphasis on the memorization of math facts in classrooms and homes, The more memorization is emphasized to students the less willing they become to think about numbers and their relations and to use and develop number sense. When 'teaching' number sense and facts **never emphasize speed**. Rapidity doesn't have a precise relation to intelligence. What is important is to deeply understand things and their relationships to each other. To develop number sense, encourage students to use, work with, and explore numbers. Provide engaging activities that focus on mathematical understanding not rote memorization. (Boaler)

Children need to believe that numbers makes sense and they can make sense of them...is that what I told those parents during their conference? Maybe, I wasn't too far off....

Now we know what Number Sense is and how important it is for our young mathematicians, but what does the number sense journey encompass? Well, we know we need to mathematize their world from an early age with experiences and discussions. We know that number sense is 'caught not taught' so how do we make sure they 'catch' Number Sense?.... Let's investigate **COUNTING!**

Everything begins with counting!!! AND GUESS WHAT? There is strong evidence that children's mastery of counting principles at the end of Kindergarten predicts their level of arithmetic abilities in the primary grades! (Big Ideas of Learning Mathematics)

Automaticity Tidbit #4 **COUNTING** *Coming Soon!*

