Rehumanizing Math Education for Better Student Understanding

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Twenty-six percent. On the nation's report card, that's the percentage of U.S. twelfth graders who are proficient in math. In America, we pride ourselves as being an exceptional country, but does 26% sound exceptional to you? Raise your hand if you think as a country, we need to do way better than this. I'm with you. We all need math, but why are so many kids confused by it? Is it because only 26% of people are hardwired for math, while 74% are not? After working with thousands of kids, I can tell you this isn't the case at all.

Kids don't understand math because we've been teaching it as a dehumanized subject. But if we made math human again, it would start to make sense again. You're probably wondering, how was math ever human in the first place? So think about it. Math is a human language, just like English, Spanish, or Chinese, because it allows people to communicate with each other. Even in ancient times, people needed the language of math to conduct trade, to build monuments, and to measure the land for farming. This idea of math as a language isn't exactly new. A great philosopher once said, the laws of nature are written in the language of mathematics.

So you see, even Galileo agrees with me. But somewhere along the line, we've taken this language of math, which is about the real world around us, and we've abstracted it beyond recognition, and that's why kids are confused. Let me show you what I mean. Read this third grade California math standard, and see if it would make sense to an eight-year-old. Understand a fraction 1/b as the quantity formed by one part when a whole is partitioned into b equal parts. Understand a fraction a/b as the quantity formed by a parts of size 1/b. And if you gave this description to an eight-year-old, you'd probably get a reaction like this.

To a math expert, this standard makes sense. But to a kid, it's absolute torture. I chose this example specifically because fractions are foundational to algebra,

trigonometry, and even calculus. So if kids don't understand fractions in elementary and middle school, they've got a tough road ahead of them in high school. But is there a way to make fractions simple and easy for kids to understand? Yes. Just remember that math is a language and use that to your advantage. For example, when I teach fifth graders how to add and subtract fractions, I start with the apples plus apples lesson.

First, I ask, what's one apple plus one apple? And kids will often say two, which is partially correct. Have them include the words as well, since math is a language. So it's not just two, it's two apples. Next is three pencils plus two pencils. You all know that pencils plus pencils give you pencils. So everyone, how many pencils? Five. Five pencils is right. And the key is you included the words. I tried this lesson with my five-year-old niece once. After she added pencils and pencils, I asked her, what's four billion plus one billion? And my aunt overheard this and she scolded me and said, are you crazy?

She's in kindergarten. How's she supposed to know four billion plus one billion? Undaunted, my niece finished his counting, looks up and says, five billion. And I said, that's right, it is five billion. My aunt just shook her head and laughed because she did not expect that from a five-year-old. But all you have to do is take a language approach and math becomes intuitive and easy to understand. Then I asked her a question that kindergartners are definitely not supposed to know. What's one third plus one third? And immediately she answered, two thirds. So if you're wondering, how could she possibly know that when she doesn't know about numerators and denominators yet?

You see, she wasn't thinking about numerators and denominators. She thought of the problem this way. And she used one apple plus one apple as her analogy to understand one third plus one third. So if even a kindergartener can add fractions, you better believe that every fifth grader can do it as well. Just for fun, I asked her a high school algebra question. What's 7x squared plus 2x squared? And this little five-year-old girl correctly answered, 9x squared. And she didn't need any exponent rules to figure that out. So when people say that we are either hardwired for math or not, it's not true.

Math is a human language, so we all have the ability to understand it. We need to take a language approach to math urgently because too many kids are lost and are anxious about math. And it doesn't have to be that way. I worked with an angry, frustrated high school student once who couldn't pass algebra because she only knew 44% of her multiplication facts. I told her, that's like trying to read and only knowing 44% of the alphabet. It's holding you back. She couldn't factor or solve equations, and she had no confidence in math. As a result, this teenager had no confidence in herself.

I told her, we have to start with multiplication because once you know all your facts by heart, everything gets easier and it'll be like having a fast pass to every ride at Disneyland. What do you think? And she said, okay. So she systematically learned her time tables in four weeks. And yes, even multiplication has language embedded in it. You'd be surprised how many kids don't realize seven times three can be spelled out as seven times three, which just means three seven times, just like this. So when kids see it this way, they quickly realize that repeated addition is slow and inconvenient, so they gladly memorize that three seven times always gives you 21.

So for this teenager who was at risk of dropping out, becoming fluent and confident in multiplication was a game changer because for the first time, she could focus on problem solving instead of counting on her fingers. I knew she had turned the corner when she figured out that a two-year car lease at $445 a month would cost you $10,680. And she looked at me disapprovingly and said, Mr. Polysock, that's expensive. At that moment, math was... Math is no longer causing problems for her, but she was using math to solve problems as a responsible adult would.

As an educator, it's my duty to challenge kids to reach higher, so I leave you with this challenge. Our country is stuck at 26% proficiency, and I challenge you to push that number higher. This is important because mathematical thinking not only builds young minds, but our kids need it to imagine and build a future that doesn't yet exist. Meeting this challenge can be as simple as apples plus apples. Insist that we teach math as a human language, and we will get there sooner rather than later. Thank you.