

## **Mathematics from the Beginning (Struggles Overcome in Kindergarten)**

*By Alexandra Berube*

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In Kindergarten, it seemed at first that \*Max did not have a strong understanding of one-to-one correspondence (he would count something twice or recount something). With more practice, however, it seemed that he may have been having difficulty with the task of physically counting objects with his hand and remembering how many objects he had touched. The combination of tasks—physically touching and cognitively counting—may have been challenging for him, rather than the concept of one-to-one correspondence itself. We found that drawing a dot for each time he counted worked better, because he was in control of each mark he was putting down, which helped him retain that he had counted the number, versus just touching an object. We have used dot-drawing ever since over physical manipulatives.

The concept that Max struggled with the most was patterns. He had difficulty continuing patterns that had already been generated, or recognizing a set pattern. For example, the children played a game in which one child made a pattern and covered up the last four objects with cups. The other child had to guess which colors the objects under the cups were, based on continuing the pattern that they could see. This was called ‘breaking a pattern’ to find a ‘unit’ of a pattern.

This was rather challenging for Max; although he understood the concept of a pattern, and was usually able to create his own patterns using math manipulatives, he had difficulty making more complex patterns and breaking patterns into units. When it was his turn to generate a pattern for his partner, he was able to build very simple patterns (like ABAB patterns), but he clearly understood what a pattern was. He just couldn’t ‘see’ a ‘unit’ of a ready-made pattern very well. With practice building his own patterns, the skills transferred over so he could recognize already-made patterns better over time. He needed to keep doing the skill on his own terms in order to recognize the skill in other students and out in the world, wherever patterns are found.

Abstract story problems are the hardest for most children, and for Max they have always been a struggle to ascertain what the problem was asking. A big piece of story problems that is challenging is when it states something like, “Bob has 5 more carrots than Kate. Bob has 8 carrots. How many carrots does Kate have?” It’s hard for children to understand that this means they need to subtract. The wording on these problems is confusing, but having Max draw dots for each sentence helped a lot. If the first sentence doesn’t tell us a specific number, we know we need to work backwards and start with the second sentence. Draw 8 carrots for Bob. This is 5 more than Kate. Does Kate have less than Bob? He has more than Kate, so she has less than him. How many less does she have? She has 5 less. Cross off 5 dots. How many does she have? 3.

It really takes a lot of repetition and using dots or objects to make these concepts more solid and less abstract. The more I talked through it, the more the logic came together. We worked backwards

through problems over and over again. I had one lesson where I would draw dots on notecards--3 dots on one card, 4 dots on another card, and 5 dots on another card. I would say, "Kate makes two cakes. Her friend makes 3 more cakes than her. Which of these [point to the 3 notecards] is her friend?" So the card with 5 dots on it is Kate's friend.

We'd do that in many ways. "Kate has 4 cats. She has two more cats than her friend. Which of these is her friend?" So the card with 2 dots is her friend. This is far more intuitive than trying to memorize if you need to subtract or add based on the wording of the problem. They will see the numbers visually and they will know (over time and practice) if they need to add or subtract. Children understand addition and subtraction on an abstract level before they understand what the operation 'addition' means. They know that 2 more than 3 is five before they know that  $2+3=5$ , if they see this with actual visual representation. Getting it visual versus through wording is key.

\*Name has been changed

### **About Alexandra Berube**

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This article was originally published on December 9, 2012 in the *Agnesis Corpus Callosum* blog.  
<http://agenesiscorpuscallosum.blogspot.com/>