The teacher already had a pretty good idea about who could find volume and who could not, so he would not have learned much by using the picture on the right. But he sure learned all sorts of stuff when he used the one on the left! On his blog, Joe writes about how they tackled some of the students' responses in subsequent activities.

Conclusion

Good problem solvers employ their own sense-making strategies automatically, but many students need support to develop those skills. By using explicit strategies such as these, you can slow down the "race to the answer" and help all students become sense-makers and mathematicians.

Flipping the Hundreds Chart

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Before students are fluent in mathematics, they need to build a strong foundation in number sense. The traditional hundreds chart has been a staple in K–2 classrooms for many years and has provided students with a framework to think about our number system. Teachers laminate posters, fill pocket charts, and refer to the numbers in the chart with the number 1 at the top left and the number 100 at the bottom right. Teachers have used it to help kindergarten students develop numeracy, recognize patterns, and get to know their numbers from 1 through 100. In first and second grades, teachers have used the chart to model addition and subtraction strategies and to help students notice imperative ideas about our system of tens. With all of this in mind, numbers are organized into a model to help students develop mathematical ideas of how numbers are structured.

We wondered why we were using a chart that did not seem to be conceptually correct. We asked ourselves, "If we continue to build the chart by adding ones, what happens?" The value of the numbers increases and students explore the concept of growth. But what really happens in the real world? For example, as students get older in age, they grow taller. When one fills up a cup of water, the water rises. In construction, when we add floors to a building, the structure gets taller. Yet in the traditional hundreds chart, if you continue to place numbers on the chart, you head downward. How can this make sense mathematically? Will it not confuse students?

With these questions in mind, on one fine day in February we flipped the hundreds chart. Our idea stemmed from Graham Fletcher's blog post, Bottoms Up to Conceptually Understanding Numbers. We wanted to see what the kindergartners would notice if we rearranged the numbers and placed 100 at the top and 1 at the bottom of the chart. What patterns would they see?

The day we revealed the inverted hundreds chart to the students, Stacy began the conversation with a "Notice and Wonder" routine to warm up the students. Anxious hands shot up with many students wanting to share their ideas when she asked, "What did you notice about the hundreds chart?" The students' reactions were amazing. "Why are

they mixed? Why is number 1 at the bottom? The numbers are backwards; 1 is supposed to be at the top like the calendar. We're counting backwards. We are past the hundredth day, so the chart flipped." The students' observations were keen and on-point. However, most students were not convinced that the hundreds chart should be flipped.

Stacy pushed the conversation further. The students needed a visual representation of what was happening, so she brought out an enormous bag of candy and a glass jar. She dropped one piece of candy at a time into the jar and asked, "What's going on?" One student replied, "The jar is filling up with candy." Stacy questioned, "And what happens when I put more candy in the jar?" The students announced that the candy would get higher. With that observation, all the students started putting candy into the jar and watched as the candy level grew higher.

We were not finished yet, however. Stacy likes to have the students act out what they are seeing, so she asked the students to show her what 100 would look like with their bodies. The students stood up straight and tall. Some students even stretched their arms up above their heads. She asked them to show her what 50 would look like. The students hunched down halfway. She next asked them what 10 would look like. Most of the students sat down with their hands in their laps. Finally, Stacy asked them what zero would look like and the students then laid themselves out on the carpet. Students all around the room giggled and enjoyed their hundreds chart charades.

The learning did not stop there since we saw this as an opportunity to push their thinking. Stacy pulled out her water bottle and asked the students to give a number for the level of water in the bottle. They guessed around 50. Quickly catching on, I grabbed my soda bottle (which was close to full) and asked the students to give a number for the level of soda in my bottle. Most guessed 90. I asked them what would happen if I drank some of my soda. I immediately started gulping as much as I could in a few seconds [not recommend!]. The students looked at me in shock, but guessed 70 or 80. Just as we finished with the mathematics discussion, one student ran up to Stacy and proudly announced, "Look at my socks!" The student explained that her socks were 100 and 0. The sock raised high above her knee represented 100 and the sock down below her ankle represented zero. I cannot think of a better way to check for understanding than that!

In one hour Stacy and I had convinced the students that the hundreds chart should be inverted. Not only had they been working on their hundreds chart, but the kindergartners had been exposed to the beginnings of addition and subtraction. To our surprise, the usual ten-minute discussion turned into days of rich conversation and weeks of extensions. In the days and weeks that followed, we kept the chart inverted and gave the students more opportunities to use the inverted hundreds chart in math stations and in three-act lessons. Our students gained so much number sense by working with a very traditional tool in a very non-traditional way. We will continue to investigate the benefits of flipping the hundreds chart.

Reference

Fletcher, Graham. 2014. Bottoms Up to Conceptually Understanding Numbers. blog. **https://gfletchy.com/2014/10/10/bottoms-up-to-conceptually-understanding-numbers**.

Editor's Note: Readers can follow the authors' kindergarten mathematics adventures on their blog ***themindofanaprilfool.com****.*