Comparing Fractions with Reasoning Skills

Summary: Comparing fractions, especially those with unlike denominators, can be extremely tricky for elementary school students. In an article for *Teaching Children Mathematics*, University of Central Florida instructor Wendy Bray and third-grade teacher Laura Abreu-Sanchez discuss a method of teaching students to compare fractions by using number sense and reasoning skills to consider why a given comparison may or may not be correct.

Practical Applications

The authors' approach centers on the use of benchmark fractions: namely 0, ½ and 1. The process occurred as such, after a few weeks of introductory fraction instruction:

- To prepare, on the first day of this unit, the students were given fraction circle manipulative kits and posed a series of word problems designed around comparing fractions with common numerators but different denominators which they discussed at length. Students were instructed to use a process of:
  - Conjecture ("Use mental imagery")
  - Verify ("Use fraction circles to show your solutions and discuss them with your tablemates")
  - Discuss ("Participate in the whole-class discussion of solutions, and be ready to justify your ideas.")
- Next, in order to introduce benchmark fractions, students used the fraction circle kits to come up with a list of fractions equal to one-half and were led to derive that fractions are equal to one-half when the numerator is half the denominator. Then, students were again posed with word problems in groups but this time urged to put the fractions in terms of benchmark fractions in their explanations. For instance, "For the fraction 9/10, students were prompted to justify that because 5/10 is equal to 1/2 and 10/10 is equal to one whole, 9/10 is 4/10 more than 1/2 and 1/10 away from one whole."
- From there, students were engaged in increasingly difficult tasks that pushed and probed at the idea of using benchmark fractions to make comparisons. For instance, students saw that 4/8 must be greater than 5/12 because 4/8 is equal to 1/2 whereas 5/12 was less than ½. Further activities later in the unit had students use these skills in different contexts, such as a fraction comparison game and models other than the fraction circles.
- The authors caution that the students had the most difficulty with fractions that were close together on one side of a benchmark – for instance, 5/8 and 6/10. In this case, students were prompted to explain that 5/8 was 1/8 more than 4/8 whereas 6/10 was 1/10 more than 5/10, and since 1/8 is greater than 1/10, 5/8 must be greater. This sophisticated reasoning was challenging for some students.

Conclusion and Citation

Commonly, students are asked to go through cumbersome calculations to compare fractions. By engaging their reasoning skills, not only do the problems become easier, but students gain a great deal of conceptual understanding of fractions that they can apply throughout math.

Abreu-Sanchez, L. & Bray, W. "Using Number Sense to Compare Fractions." *Teaching Children Mathematics* (Sept. 2010), http://tinyurl.com/4mrm3xm (subscription only).