

Abstract

Students struggle when first introduced to decimals for many reasons. In our research we tried to answer the questions: (1) What difficulties do students have in reasoning about decimals and place value?; (2) What teaching strategies and representations can help students accurately compare two decimal representations?; and (3) What teaching strategies and representations can help students learn decimal addition and subtraction with understanding? Over the span of 9 weeks we worked with four students entering fifth grade. Students completed a pre- and post-interview and written assessment and attended 7 one-hour class sessions. Students worked with manipulatives and learned the concepts behind decimal numeration and the operations. We intentionally avoided direct instruction of the algorithm and instead focused on instruction that would foster conceptual understanding. The decimal and fractions progressions written by The Common Core State Standards Writing Team (2012) were used along with other literature to design instruction. We video recorded each instructional session, transcribed it, and used our observations about the video recorded data to design the next lesson. We found that our students benefitted from the use of physical manipulatives, grids and drawing decimal numerations. Whenever they became confused, we could refer them back to their drawings instead of back to an algorithm because the drawings prompted them to think conceptually. We used the five strands of mathematical proficiency to gauge the students' level of understanding. In the post assessments, students showed marked improvement in understanding place value, subtracting decimals, and visually representing and comparing decimals.

