

# Extending K-8 Mathematics Concepts in Alternate Bases

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## Abstract

When learning to represent mathematics with manipulatives, many pre-service K-8 teachers rely on memorized rote procedures to perform the associated mathematical tasks; then they arrange the manipulatives to match their result, often with minimal understanding of underlying mathematical connections. In a Number and Operations course for K-8 pre-service teachers, a portion of the class was conducted in alternate bases: Base 6 and Base 8 Blocks were used to model operations with integers to facilitate deeper understanding of the number systems and arithmetic processes being represented. Fractions and decimals were later covered only in Base 10. On midterm and final exams, students were tested not only on alternate base material covered in class, but on extensions of alternate base concepts that had not explicitly been covered. These extensions included performing arithmetic operations on integers too large to model with concrete manipulatives, as well identifying and computing with fraction and “decimal” representations of numbers in alternate bases. This paper describes the instructional tasks and assessment items used, as well as student outcomes on the assessments. Promising results suggest that with sufficiently deep understanding of a few core concepts, students can extend their mathematical thinking independently and meaningfully.