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Wright, Vince

Frequencies as proportions: using a teaching model based on Pirie and Kieren's model of mathematical understanding.

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Summary: *S. Pirie* and *T. Kieren* [Learn. Math. 9, No. 3, 7–11 (1989; ME 1991a.00431); J. Math. Behav. 11, No. 3, 243–257 (1992; ME 1994d.01434); Educ. Stud. Math. 26, No. 2–3, 165–190 (1994; ME 1995d.02089); Learn. Math. 14, No. 1, 39–43 (1994; ME 1994f.02483)] created a model (P-K) that describes a dynamic and recursive process by which learners develop their mathematical understanding. The model was adapted to create the teaching model used in the New Zealand numeracy development projects. A case study of a 3-week sequence of instruction with a group of eight 12- and 13-year-old students provided the data. The teacher/researcher used folding back to materials and images and progressing from materials to imaging to number properties to assist students to develop their understanding of frequencies as proportions. The data show that successful implementation of the model is dependent on the teacher noticing and responding to the layers of understanding demonstrated by the students and the careful selection of materials, problems and situations. It supports the use of the model as a useful part of teachers' instructional strategies and the importance of pedagogical content knowledge to the quality of the way the model is used.

Classification: F80 C30 D40

Keywords: mathematical understanding; teaching model; percentages; ratios

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