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On adult students learning fractions at a community college.

Summary: This paper deals with the process of learning fractions by adult students attending courses of remedial mathematics at community colleges in the Bronx, New York City. It investigates the schema of fractions with the help of the model created by *C. Y. Charalambos* and *D. Pitta-Pantazi* [Educ. Stud. Math. 64, No. 3, 293–316 (2007; ME 2008a.00309)], which is based on the work of [*T. E. Kiernan*, "On the mathematical, cognitive and instructional foundations of rational numbers", in: R. Lesh (ed.), Number and measurement: paper from a research workshop ERIC/SMEAC, Columbus, Ohio, 101–144 (1976)] and the assumption that the fraction schema is composed of five subconstructs, a fundamental part whole subconstruct and four subordinate subconstracts: ratio, quotient, operator and measure. As Charalambos and Pitta-Pantazi [loc. cit.] conducted their research among young children its application to the case of adult student brings interesting comparative knowledge about the fraction schema of children and adults. For adult students, we were able to find partial support for the Kiernan fraction schema because all the subordinate sub-constructs except ratio correlated significantly with the part-whole subconstruct. It was determined that, while the adults engaged in mathematical reasoning about ratios and the abstract operator concept with approximately the same level of proficiency as the children however, the adult students were not able to assimilate this information into their fraction schema nearly as efficiently as the children. It is of significance that adult students had understood ratio as a separate concept from part-whole. The ratio sub-construct is typically used to represent a comparative process between quantities and the part whole sub-construct represents a process of taking a fraction part out of a total. The lack of flexible thinking in understanding the subtle relationship between the fraction as a numerical quantity corresponding to the number of parts taken out of a partitioned whole and as a comparative process in the ratio sub-construct is evidenced by a common addition error. When a students add: $\frac{1}{3} + \frac{2}{5}$ and obtain $\frac{3}{8}$ they are incorrectly employing addition of ratios as a natural extension of the addition of whole numbers. The fact that the ratio is separate from the rest of their fraction schema, and that the operation of addition of ratios is a natural extension of whole number addition suggests changes in the curriculum. Perhaps the ratio concept needs to be more extensively taught including its natural operations while highlighting the subtle relationships between the ratio and part-whole sub-constructs.