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Math 689
Assignment 7

The web sites, videos, and discussions for this assignment demonstrated many ways to teach the multiplication and division of fractions. Some of the sites used some visual demonstrations, and most of the sites encourage students to multiply before simplifying. Because many of the problems that continue to arise for college level mathematics students are due to incorrect or incomplete learning of fractions in earlier years, one must strive to find the best way to teach fractions so that the student can carry similar patterns with them to the learning of Algebra.

The teaching of fractions, in particular teaching how to simplify fractions, is grounded in the concept of prime factorization. Prime factorization is key for the student in so many ways. When students are able to understand the concept, they will naturally develop in themselves the pattern of factoring in a logical and systematic way. This will lead the student into being ready to handle more difficult and complicated algebra problems.

It is my contention that prime factorization using the division method is the best, as it reduces the chance for errors and incompleteness commonly found using the tree method. Moreover, it encourages the student to use a systematic method; it builds on the idea of patterns commonly used later in other mathematics courses and in critical thinking.

For division of fractions, it is important to show students what division means. For example, $8 \div 2$ means "2 times some number equals 8". Also, it begs the question, "How many 2's fit into 8?" This can be connected to fractions. For example, $4 \div \frac{1}{2} = 8$ because 8 $\frac{1}{2}$'s fit into 4. One can illustrate this pictorially as well, and should. Manipulatives can be used to

demonstrate the concept, and real life examples can be used. As a more complicated example, $\frac{3}{4} \div \frac{1}{2}$ means, "How many $\frac{1}{2}$'s fit into $\frac{3}{4}$?" This can be shown to be $\frac{3}{2}$. An explanation showing how to multiply by the reciprocal is important to connect the student to a simpler and quicker way to simplify once the concept has been learned.

The key here is twofold: Engage the student by getting the student to become an active participant in his or her learning. There are many ways this can be accomplished. Among the best ways is to, as the teacher, exude enthusiasm. Mathematics is fun; mathematics is doable. Mathematics is full of hidden beautiful meaning, deeper meaning. "The true teacher awakens a love for truth and beauty in the heart – not the mind – of a student…" (Garcia, 1994). Also, the instructor must ask the students questions that get them to think about what has been taught. Secondly, one must show connectedness between what is taught now and why it is being taught in a particular way. And further, how the patterns the teacher is encouraging will continue to pay off in Algebra and beyond. "Concepts that relate to each other, reinforce each other, and illuminate each other" (Lewis, 2006) are important to present to the student.

When students begin to understand connectedness, that is to say they understand the link between simplifying fractions and simplifying monomials and rational expressions, they are undergoing an important process. They are able to recreate the rules. They are able to rediscover rules. Memorization becomes less important than understanding.

References:

Garcia, David (1994). ***Math in Danger in the USA*,**
http://www.mathforum.com/social/articles/garcia.html

Lewis, Robert (2006). *Mathematics: The Most Misunderstood Subject*
http://www.fordham.edu/mathematics/whatmath.html