

Developing the Fraction Concept

Dr. Stan Hartzler Archer City High School

The notion of *fraction* has three or four aspects, depending on who is doing the writing. Four aspects will be presented here.

- **Fractional part of a whole**. If a candy bar is cut into four equal pieces and three are eaten, then $\frac{3}{4}$ of the bar has been eaten.
- **Fractional part of a group**. If twelve people are in equal groups at three tables, two of them square, then $\frac{2}{3}$ of the people are at square tables. No cutting is done.
- **Ratio**, including per cent and degree measure of angles and arcs. Of every 1000 people in Sri Lanka, 512 (or 51.2%) are female. Ratios are often left unreduced. This sometimes clarifies meaning, as in 60%.
- **Division**. The fraction $\frac{23}{4}$ equals 5.75, and division establishes the equality. Division is often expressed with a fraction bar. In this sense the ratio aspect is usually hidden ($5.25 = \frac{5.25}{1}$).

Whenever a mathematically-literate person encounters a fraction in a real-world situation (time signature in music, results of a poll, length measure), the collection of aspects of fraction meaning listed above become active in the mind as a set, as a concept node. The situation is matched with one or more of the aspects listed; understanding is obtained, and working with music, popular image, or length, is enabled.

The varied aspects of the meaning of fraction are difficult to digest. Most people who are comfortable with fractions arrived at the level of comfort with great courage and persistence, applied in many diverse situations over many years.

The typical elementary textbook exacerbates student confusion and subsequent anxiety concerning fractions. Typically, one early chapter develops the first aspect. A much later chapter develops the second aspect, without any attention to the issue of same symbolism for both a new and a vaguely-remembered, older idea. An environment has been established for student confusion and erosion of confidence.

The helpful teacher reviews the first aspect daily while the second aspect is being introduced. Confronting such probable points of confusion, together, briefly, and daily, helps develop concept nodes.

The teacher may also verbalize about the natural discomfort: "If you're feeling confused about fractions right now, you're all right. We'll learn this again every day for a while, and then you'll get used to fractions. Some time later, you will study two more aspects of the idea of a fraction, and you will get familiar and smart about those also."