

## Exploring Virtual Math Manipulatives Online - The Power of Educational Media

Teaching for meaning is a major focus of education. The work of Piaget and others suggests that students begin their exploration of concepts through hands-on experiences with manipulatives.

Mathematics teachers know that students learn in different ways and that it is important for them to teach mathematics concepts using different representations. There has been an emphasis in mathematics education on the use of concrete objects or manipulatives to represent mathematical ideas to help students deepen their conceptual understanding and communicate their thinking. In *Principles and Standards for School Mathematics* (2000), NCTM (National Council of Teachers of Mathematics) discusses the Representation Standard and recommends the following:

Teachers need to give students experiences in using a wide range of visual representations and introduce them to new forms of representations that are useful for solving certain types of problems. (NCTM 2000, p. 284)

Virtual manipulatives are an excellent addition to hands-on manipulatives, drawings, spoken and written language, and other forms of representation. Virtual manipulatives allow a student to interact with the computer in a learning situation and to experience active learning. Virtual manipulatives appeal to a variety of senses and motivate students.

This roundtable will focus on representing various mathematical concepts using the power of educational media via virtual manipulatives. We will illustrate several websites where virtual manipulatives are housed and can be accessed, including the National Library of Virtual Manipulatives and the National Council of Teachers of Mathematics. These are interactive websites with access to anyone. Each website contains a library of uniquely interactive, web-based virtual manipulatives or concept tutorials, mostly in the form of Java applets, for mathematics instruction. We will use a laptop to illustrate the interactive nature of the websites and the extensive library of each. Virtual manipulatives to be illustrated include Geoboards, Color Chips, Algebra Tiles, Balancing Scales, Pattern Blocks, Spinners,

Coin Tossing, Dice Rolling, Card Playing, Problem Solving, and many more. These virtual manipulatives will connect to five mathematics strands: 1) Number Sense, 2) Geometry and Spatial Sense, 3) Measurement, 4) Data Analysis and Probability, and 5) Algebra.

Learning and understanding mathematics, at every level, requires student engagement. Mathematics is not, as has been said, a spectator sport. Too much of current instruction fails to actively involve students. One way to address the problem is through the use of virtual manipulatives. A handout will be available in addition to the roundtable discussion. This roundtable will emphasize the power of educational media through the use of virtual manipulatives available on the internet.