

Using Virtual Manipulatives in Teaching Mathematics through a Multimedia Approach

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Abstract: 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 manipulatives, physical objects that help students visualize relationships and applications. Computers can now be used to create virtual learning environments to address the same goals. This roundtable session will focus on various virtual manipulatives that can be used in teaching mathematics. Mathematics topics to be explored include Number & Operations, Algebra, Geometry, Measurement, and Data Analysis & Probability. References will include several online websites.

Problem:

What are virtual manipulatives? Why use virtual manipulatives in teaching mathematics? What virtual manipulatives are available to mathematics teachers on the Internet?

Summary:

If we are to be successful in teaching mathematics, then student engagement is a necessity. Much of today's instruction does not actively involve students. The use of manipulatives is an effective way to involve students in the learning process. A recent innovation is the use of computers to create virtual learning environments. Virtual manipulatives offer computer-generated objects that can be manipulated by a computer user. Virtual manipulatives have the power to make visible that which is hard to see, and impossible to imagine. This roundtable session will explore manipulatives that can be used in teaching the following mathematics strands: Number & Operations, Algebra, Geometry, Measurement, and Data Analysis & Probability. These are strands used in the *Principles and Standards for School Mathematics* publication of the National Council of Teachers of Mathematics. Mathematics activities will be illustrated for grade levels K-14 and for math education at the university level. A highlight will be an e-connection to a Math Dictionary, where word definitions can be found for various mathematics terms. The session will use a laptop PC to illustrate the various manipulatives being explored. The session will demonstrate websites that connect to virtual math manipulatives, illustrate the process of using it, show participants some of the complexities and tricks about it, and give them an opportunity to try it themselves. Virtual manipulative activities on CD-Rom and various websites on Internet will be illustrated and explored, and will be selected based on the participants' interests regarding a grade level. Virtual manipulative activities will be connected to websites of the National Library of Virtual Mathematics for Interactive Mathematics, National Council of Teachers of Mathematics, Math Forum, Marco Polo, and Eisenhower National Clearinghouse for Mathematics and Science Education. Participants will be involved in interactive simulations of various mathematical tasks. Some examples of various mathematics manipulatives are: Geoboards, Platonic Solids, Polyhedra, Deltrahedra Solids, Catalan Solids, Magic Squares, Fractals, Tangrams, Math Dictionary, Pascal's Triangles, Two-Color Counters for Integer Operations, Algebra Tiles, Coin Tossing, Dice Tossing, Transformations, Isometric Dot Paper, Fractions, Directed Paths, and Pythagorean Theorem. Explorations will feature eexamples and iexamples of various mathematics activities. Participants will discuss instructional strategies, procedures, and evaluation procedures for using virtual manipulatives. The session will attempt to create a dialogue and networking among participants regarding pros and

cons of using online virtual math manipulatives. This roundtable session will allow maximum interaction in an informal, small-group discussion on the topic of using virtual manipulatives in teaching mathematics.

References:

National Library of Virtual Manipulatives for Interactive Mathematics: <http://matti.usu.edu/nlva/nav/>

National Council of Teachers of Mathematics: <http://www.nctm.org/eresources>

Math Forum: <http://www.mathforum.org/tools>

Marco Polo: <http://www.marcopolo-education.org/>

Eisenhower National Clearinghouse for Mathematics and Science Education: <http://www.enc.org>