MANIPULATIVES IN MATHEMATICS 2

Ma 516

Course Description

This course continues the exploration of using manipulatives to teach mathematics. Students will be expected to demonstrate and use the manipulatives in their own classroom.

Goals of the Course

1. To enable students to attain a level of comfort and excellence in creating and conducting activities in mathematics using manipulatives.
2. To provoke thinking about mathematics and thinking about mathematics education.
3. To emphasize the importance of exploration and the actual doing of mathematics in the classroom.
4. To instill the importance of problem solving, communication, and reasoning in the mathematics curriculum.
5. To emphasize the importance of estimation, number sense, spatial sense, patterns and relationships, making sense of data, and making mathematical connections in the mathematics curriculum.
6. To model the use of experimentation, games, cooperative learning, and the use of technology in the classroom.
7. To provide insight into assessment procedures.

Instructional Procedures

The course is designed to enable students to attain a familiarity and proficiency in using manipulatives to teach K-8 mathematics. The course is conducted in such a way that it provides a model for the teaching process and thus includes hands-on use of manipulatives that engages students to reflect on mathematical ideas. The course should include discussion on how we know what children are learning, how they communicate this, and what we do with this knowledge. The course emphasizes cooperative learning, writing, and assessment procedures.

Course Content

1. Introduction to a variety of mathematical concepts.
2. Introduction to the wide variety of commercial manipulatives that are available such as Cuisenaire rods, geoboards, origami (paper folding), base ten blocks, and pattern blocks.
3. Introduction to commercial software, LOGO, and CD ROM's that are available for the teaching of mathematics at the K-8 level.

4. The teaching of K-8 mathematics through the use of manipulatives that can be made or obtained inexpensively.
5. The use of manipulatives in learning through games, exploration, experimentation, and group work.
6. The use of manipulatives in teaching mathematical concepts such as fractions, logic, geometry, 3-D spatial visualization, algebra, and problem solving.

Evaluation Measures

1. Class participation in activities.
2. Reaction papers on films, activity lessons, and journal articles.
3. Projects (e.g., invent a game or activity which implements the "doing" of math).
4. Formal write-up for the thought process involved in the solution to a math problem.

Bibliography

A. Required Text

Elementary School Mathematics: Teaching Developmentally, 2d ed., by John A. Van de Walle, Longman Publishing Group, New York and London, 1994.
About Teaching Mathematics: A K-8 Resource by Marilyn Burns, Cuisenaire Company of America (Math Solutions Publications), White Plains, NY, 1992.

B. Additional Required Reading

Addenda Series: Grades K-6, National Council of Teachers of Mathematics, Reston, VA.

Subject-Matter Books: Grades K-6, National Council of Teachers of Mathematics, Reston, VA.
Geometry and Spatial Sense
Making Sense of Data
Number Sense and Operations
Patterns

Addenda Series: Grades 5-8, National Council of Teachers of Mathematics, Reston, VA.
Dealing with Data and Chance
Developing Number Sense in the Middle Grades,
Geometry in the Middle Grades,
Measurement in the Middle Grades
Patterns and Functions
Understanding Rational Numbers and Proportions

C. Supporting Bibliography

Instructor's Manual to accompany Elementary School Mathematics: Teaching Developmentally, 2d ed., by John A. Van de Walle.

Standards for Curriculum and Evaluation, National Council of Teachers of Mathematics, Reston, VA, 1989.

D. Relevant Periodical Sources

Teaching Children Mathematics (formerly Arithmetic Teacher), National Council of Teachers of Mathematics.
Elementary Mathematician, Consortium of Mathematics and Its Application (COMAP).
Mathematics Teaching in the Middle School, National Council of Teachers of Mathematics.

E. Other Resources

Videos

Mathematics: What are you teaching my child? featuring Marilyn Burns, Scholastic, Inc.*

Mathematics with Manipulatives Series:*
Pattern Blocks
Cuisenaire Rods
Base Ten Blocks
Geoboards
Color Tiles
Six Models

Mathematics: Teaching for understanding. Cuisenaire Company of America.*

Manipulatives

Geoboards*
Mira Math*
Algeblocks*
Instructor's Cuisenaire Manipulatives Set and resource book*