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CHAMINADE UNIVERSITY OF HONOLULU
Island: Hawai`I (Kona)

Winter 2000
Jan. -Mar. 2000

ED 445: MATHEMATICS CURRICULUM AND METHODS

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RATIONALE

The National Council of Teachers of Mathematics (NCTM) states that "knowing math is doing math." This applies to all levels of instruction, pre-K through grade 12. This course will focus on the development of mathematical concepts from early childhood through grade 3. The course will demonstrate how to teach these concepts using manipulatives and providing experiences that allow children to construct their own understanding.

OBJECTIVES

1. **To examine current research on development and learning for its applicability to current trends and best practice in early childhood/elementary classrooms;**
2. **to make students aware of the NCTM standards and discuss implications for practice;**
3. **To present the Montessori math sequence of activities for early childhood education'**
4. **To facilitate the development of the skills necessary to design and present developmentally appropriate math activities and lessons;**
5. **To facilitate the development of the knowledge and skill needed to sequence math learning experiences;**
6. **To explore the management implications of using learning centers, manipulatives, cooperative learning, and small group strategies;**
7. **To explore a variety of assessment tools appropriate to constructivist learning strategies,**
8. **To provide a constructivist learning environment with a math learning center as a model for preservice teachers that incorporates cooperative learning and manipulative strategies;**
9. **To provide pre-service teachers with math learning experiences that can facilitiate construction of their own knowledge of math concepts as they develop an understanding of and appreciation for how they themselves learn and think about math;**
10. **To provide an experience with the implementation of NCTM standards at the local level through observation at selected schools; and**
11. **To provide students with an opportunity to further develop their writing skills by keeping a journal.**

OUTCOMES

Upon successful completion of this course, students will be able to:

- **Apply current research on how children learn math to their own teaching practice;**
- **Implement NCTM standards in their own practice in keeping with recent research findings about how children learn math,**
- **Demonstrate math concepts using Montessori math materials for early childhood education;**
- **Design and create developmentally appropriate math activities that enhance their school's math curriculum;**
- **Set up a learning center and use it to create a developmentally appropriate sequence of math learning activities;**

Employ appropriate management strategies to facilitate cooperative learning strategies, use of learning centers and of manipulative math materials to involve students in their own learning process;

Create an environment in which children construct their own knowledge and understanding of math concepts;

Employ alternative assessment models that are appropriate for "doing math" with manipulatives;

Engender excitement about math because they have a better understanding of how math works.

COURSE REQUIREMENTS AND EVALUATION

Attendance and participation	**35 points**
Journal writings (5)	**15 points**
Activity writeups (4, corrected copies)	**32 points**
Curriculum manual, lesson plans	**40 points**
Curriculum map/sequence	**18 points**
Projects	**60 points**

- **Numeration to ten**
- **Place value (base ten)**
- **Literature**
- **Applications of math**

TEXT

Van De Walle, John A., Elementary and Middle School Mathematics, 3rd edition, Longman

ASSIGNMENTS

Attendance and participation — **7 pts. per weekend, 35 points total**

In order to gain an understanding of these teaching principles, it is necessary to attend class and to participate in class activities and discussions. Points will be deducted for each class session missed. In addition, missing the equivalent of 7 points will automatically lower your grade by one level. If a student should miss anymore than that, he/she will be advised to retake the class.

Journal writings (5) — 3 **points each, 15 points total**

Each week, you will submit a written journal to record your feelings, and reactions to the course content. Each journal should be about one-page in length, and the instructor will specify the topic or issue to discuss.

Activity writeups (4) — **8 points each, 32 points total**

Assigned lesson plans need to be submitted to the instructor for review one week after the lesson is presented in class. 5 points will be given for each lesson that is well-written (clear, correct, proper grammar and spelling). After it is reviewed by the instructor, the writeup should then be corrected and enough copies should be made for the class members, as well as the instructor. Copies should be distributed at beginning of following week.

Curriculum manual **40 points**

You will assemble a curriculum notebook which will contain all the lessons presented, as well as other activities that are appropriate for the placement in learning centers for children. Lessons should be appropriately illustrated. Your finished manual will be evaluated for its organization, completeness, accuracy, and aesthetics.

Curriculum map/sequence **18 points**

Your curriculum manual is a linear presentation of the activities and lessons covered in the course. As your final, you will develop a "map" to reflect your understanding of how these separate lessons/activities come together as a unified whole. Your "map" should show what activities students may be working on concurrently and it should show the sequencing of activities when appropriate.

Projects **60 points**

You will be developing several activities/workjobs throughout the course. You will present to the class an overview of your activity, as well as copies of your writeup. You will be graded on the completeness of your writeup, the appropriateness, completeness and aesthetics of your activity/workjob. Your projects will cover the following topics:

Numeration to 10	10 pts.
Place Value (base ten)	10 pts.
Literature	10 pts.
*****Applications of math**	**30 pts.**
(geometry, measurement, time, money, graphing)	

*****The applications of math project involves a set of 3 activities for one of the content areas. Thus, you will need 3 separate writeups; and activities should be sequenced.**

COURSE EVALUATION

184 - 200 points	**A**
162 - 183 points	**B**
140 - 161 points	**C**
124 - 139 points	**D**
Below 124 points	F

Points will be deducted for assignments turned in late. All assignments need to be turned in by March 18, 2000 in order to be computed in your final grade.

An "I" or incomplete grade is given only when unusual or extenuating circumstances prevent a student from completing the coursework, as it is scheduled. Prior consultation with the instructor is necessary.

COURSE OUTLINE
ED 445, Winter 2000, Hawai`i (Kona)

Friday, January 14, 2000
- Introductions
- Course syllabus, assignments, expectations
- Format for activity writeup - 3 period lesson
  - Handout of cuisenaire rod mystery game
- What is math?
- NCTM standards

READ: Chapters 1 and 2

Saturday, January 15, 2000
- PRENUMBER EXPERIENCES
  - Attribute blocks
    - Sorting
    - Patterning
    - Change game
  - Graphing
  - Measuring (without numbers)
- NUMERATION TO TEN
  - Number rods
  - Sandpaper numerals
  - Rods with numerals
  - Spindle boxes
  - Odd and even game
  - Mystery game
  - Bead stair with numerals
  - Search for ten

Friday, Feb. 4, 2000
- Review, handouts of lessons
- (1-10) project presentations
- INTRODUCTION TO PLACE VALUE
  - Introduction to base ten (quantity)
  - Crisis of nine
  - Quantity layout and games
  - Introduction to base ten (symbols)
  - Symbols layout and games
  - Quantity and symbols - fetching games
  - 45 layout

Saturday, Feb. 5, 2000

INTRODUCTION TO PLACE VALUE (cont., if necessary)

LINEAR COUNTING

- Teen boards - quantity
  - Symbols
  - Quantity and symbols
- Ten boards - quantity (tens only)
  - Symbols
  - Quantity & symbols (tens only)
  - Quantity & symbols (10 - 99)
- Hundred board
- Chains - 100 and 1,000

Readings: Chapters 3, 9, 18

Journal writing

Activity writeups

Friday, Feb. 25, 2000

Place value (base ten) project presentations

PLANNING FOR EFFECTIVE INSTRUCTION

OPERATIONS ON WHOLE NUMBERS

- Addition without regrouping
- Exchange game
- Addition with regrouping
- Multiplication without regrouping
- Multiplication with regrouping
- Definitions and properties of the operations
- Algorithms for the operations

Saturday, Feb. 26, 2000

OPERATION ON WHOLE NUMBERS (cont.)

- Subtraction without regrouping
- Subtraction with regrouping
- Division without regrouping
- Division with regrouping
- Definitions and properties of the operations
- Algorithms for the operations

ASSESSMENT

Readings: Chapters 5, 7, 10, 11, 22; and 16, 17

Journal writing

Activity writeups

Friday, March 4, 2000
Literature project presentations

MEMORIZATION OF MATH FACTS
Strip boards for addition, subtraction
Bead boards for multiplication, division
Finger charts

Saturday, March 5, 2000
RATIONAL NUMBERS - FRACTIONS
Naming
Equivalents
Operations with fractions
Algorithms for operations with fractions

PROBLEM SOLVING

Readings: Chapters 4, 8, 10, 12, 13
Journal writing

Activity writeups

Friday, March 17, 2000
TEACHING ALL CHILDREN MATHEMATICS
Final project presentations (geometry, measurement, graphing, time, money)

Saturday, March 18, 2000
Final project presentations

Readings: Chapter 23
Journal writing
Curriculum manual
Curriculum map/sequence