

**GEORGE MASON UNIVERSITY (GMU)
COLLEGE OF EDUCATION AND HUMAN DEVELOPMENT (CEHD)
OFFICE OF ADULT LEARNING AND PROFESSIONAL DEVELOPMENT (OALPD)**

EDUC 500: Inquiry-Based Mathematics Instruction in Grades 3-8

Spring 2012

January 9 – April 30, 2012

Kelly Leadership Center, room 2011

Prince William County Schools

Instructor: *Donna Stofko*

Phone: 703-791-8849

FAX: 703-791-7336

E-mail: *stofkoda@pwcs.edu*

Address: *PO Box 389*

Manassas, VA 20108

Course Description:

Inquiry-Based Mathematics Instruction is based on the principles of Math Recovery and deals with place value, multiplication, division, fractions and decimals. This course relies heavily on recent research in these areas and builds from a diagnostic assessment developed by Wright, Stafford, and Martland. Teachers will learn this assessment to diagnose areas of difficulty as well as strategies for remediating these difficulties. The assessment focuses on the sophistication of strategies students use to solve problems in these three areas. During this class teachers will videotape their work with students on assessments and learn research-based methods for teaching mathematics for understanding. The primary focus of this course is to increase both the content knowledge of teachers and the pedagogical background needed to teach effectively in an inquiry-based mathematics classroom.

Course Purpose and Intended Audience:

Results of national and international tests in mathematics achievement point to the need of reform in mathematics education for elementary students. This course is designed to increase teachers' knowledge of mathematics and the hierarchy of sophistication of children's strategies in place value, multiplication and division, and fractions. Teachers will develop ease with an assessment to diagnose difficulties in mathematics and strategies to remediate these difficulties.

Course Format:

Class meetings will be structured for maximum teacher participation. Each class will begin with discussion of mathematical topics and readings. The focus of the mathematical content will be based on the readings assigned. Mathematical problems, activities and lessons supporting these concepts will be modeled, practiced and discussed.

Course Objectives:

- Teachers will have a working knowledge of an instrument to determine students' mathematical knowledge and strategies used to solve problems in the areas of place value, multiplication and division, and fractions.
- Teachers will focus their attention on strategies students use to solve problems.
- Teachers will shift their focus from teacher activities to student learning.
- Teachers will increase their own content knowledge of the mathematics they teach at the elementary level.
- Teachers will learn strategies to teach, remediate, and enrich the concepts of place value, multiplication and division, fractions and decimals.

Required, Supplemental, and Recommended Texts

Required Texts:

Math Matters, by Suzanne H. Chapman and Art Johnson

Accessible Mathematics, by Steven Leinwand

Supplemental Readings:

Selected articles pertaining to early mathematics acquisition and instruction from a variety of sources including: *Teaching Children Mathematics*, *Journal for Research in Mathematics Education*.

Class Requirements, Performance-Based Assessments, Evaluation Criteria, and Grading Scale:

1. **Attendance and Class Participation:** Attend and participate in all class sessions. Repeated absences will be reflected in the course grade. Complete all readings for class discussions and participate in all discussions and activities. (10 points per class)
 - a. Expectation: We have much to offer and learn from one another; therefore, active and respectful participation of all class members is crucial to the success of this course. Class discussion and activities cannot be reproduced. Participants in this class must be in attendance and on time for the entire class session in order to actively contribute to the enhancement of each session.
 - b. Note: failure to attend more than 20% of the classes will result in failure (F) in the course.
2. **Article and Chapter Reflections:** Read and respond to all reading assignments. (10 points each)
 - a. Expectation: Reflections will include relevance to the teacher's professional growth, possible changes in student behavior, and mathematical growth that might occur if ideas in the readings are implemented. All points in reflections must be supported informally, by references from the article. Activities are to be explored independently and noted as part of the reflections.
Reflection format:
 - i. At least two pages, double spaced
 - ii. Margins should be no wider than 1.25 inches
 - iii. Font size - 12
 - iv. Font Type – Times New Roman or Ariel

3. **Mathematics Problems** – (5 points each) Problems will be posed during class, at the close of class, or online. These problems are to be solved with all thinking shown and participants should be prepared to discuss their solutions.
4. **Inquiry-based lesson plan and summary of lesson:** (20 points) Choose an inquiry-based lesson, write a lesson plan for this lesson as well as a reflection upon completion of the lesson.
 - a. Expectation: Lesson plan will be completed on a choice of forms provided. Reflections will be an informal description of the actual lesson after it was taught. Particular emphasis should be placed on the teacher's professional pedagogical growth, e.g. what was surprising and what would need to be done differently if he/she taught this lesson again.
5. **Assessment Videos:** Each teacher will videotape themselves administering the assessment and share this videotape with other teachers in class. (10 points each)
 - a. Videotapes will also be used to practice evaluating student Math Intervention levels.
6. **Class Reflections:** A reflection will be written on the class discussion board (online) . (5 points each)
 - a. Reflections will focus on thoughts about mathematics and changes in viewpoints or approaches to teaching mathematics. Observations and thoughts about classroom discussions should also be included. Teachers should anticipate spending at least 15 minutes writing in their journal for every class period.

Formula for Grading:

Percentages based on total possible points throughout the course.

A 90% - 100%

B 80% – 89%

C 70% - 79%

F below 70%

Late assignments will only be accepted the class session following the one where the assignment was due.

COLLEGE OF EDUCATION AND HUMAN DEVELOPMENT STATEMENT OF EXPECTATIONS:

The Graduate School of Education (GSE) expects that all students abide by the following:

Students are expected to exhibit professional behavior and dispositions. See gse.gmu.edu for a listing of these dispositions.

Students must follow the guidelines of the University Honor Code. See http://www.gmu.edu/catalog/apolicies/#TOC_H12 for the full honor code.

Students must agree to abide by the university policy for Responsible Use of Computing. See <http://mail.gmu.edu> and click on Responsible Use of Computing at the bottom of the screen. Students with disabilities who seek accommodations in a course must be registered with the GMU Disability Resource Center (DRC) and inform the instructor, in writing, at the beginning of the semester. See www.gmu.edu/student/drc or call 703-993-2474 to access the DRC.

PRINCE WILLIAM COUNTY SCHOOLS MATH DEPARTMENT STATEMENT OF RESPONSIBILITY:

Teachers taking graduate level classes paid for by the PWCSMath Department will be expected to attend all classes and to complete all assignments. Anyone dropping a class after it has started, failing a class, or not attending after registering in the online catalogue will not be permitted to take any other class paid for by the Mathematics office. Dropping a class from the online catalogue must occur at least 48 hours prior to the start of the first class or this penalty will be in effect.

If, for some extraordinary reason, it is necessary to drop the class after it has begun, GMU withdrawal procedures must be followed. Failure to drop with GMU within their guidelines will result in an F for the class.

Syllabus

Inquiry-Based Mathematics Instruction in Grades 3-8

Class	Date	Topic	Readings/Assignments (for the next class)
1	1/9	<ul style="list-style-type: none"> Course Introduction Number Sense 	Math Matters – Chapter 1 Math Matters – Ch. 2 p.31 - p.48
2	1/23	<ul style="list-style-type: none"> Number Sense Assessment #1: Place Value 	Video Assessment #1 (Place Value) Math Matters, Ch. 3
3	1/30	<ul style="list-style-type: none"> Computational Fluency: Addition and Subtraction View and discuss video 1 (Place Value) 	Accessible Mathematics – p. 1-38
4	2/6	<ul style="list-style-type: none"> Discussion of Leinwand chapters Continue Addition and Subtraction (integers) Discussion of Inquiry-based lesson plan/summary 	Note: Begin gathering resources and ideas for inquiry-based lesson. Math Matters, Ch. 4
5	2/13	<ul style="list-style-type: none"> Assessment #2: Multiplication. & Division Multiplication and Division chapter discussion and activities 	Video Assessment #2 (Multiplication and Division) Accessible Mathematics – p. 39-71
6	2/27	<ul style="list-style-type: none"> View and discuss multiplication and division videos Continue Multiplication and Division 	Math Matters – begin reading chapter 5 p. 99 – through the top of p. 122
7	3/5	<ul style="list-style-type: none"> Fractions Assessment #3: Fractions Work on inquiry-based lesson 	Video Assessment #3 (Fractions) Math Matters – remainder of chapter 5
8	3/12	<ul style="list-style-type: none"> View Fractions assessments Fractions 	Math Matters – Ch. 6 (pt. 1)
9	3/19	<ul style="list-style-type: none"> Fractions and Decimals 	Ch. 6 (pt. 2) Teachscape Module (Problem Solving)
10	3/24 (Sat.)	BNVCTM conference	Reflection of conference
11	3/26	<ul style="list-style-type: none"> Fractions and Decimals 	Article
12	4/9	<ul style="list-style-type: none"> Fractions and Decimals 	Math Matters – Ch. 7
13	4/16	<ul style="list-style-type: none"> Fractions, Decimals, and Percent 	Math Matters – Ch. 8
14	4/23	<ul style="list-style-type: none"> Ratios 	Accessible Mathematics, p. 79-113
15	4/30	<ul style="list-style-type: none"> Lesson Presentations 	

ASSIGNMENT RUBRIC FOR ARTICLE/CHAPTER/JOURNAL REFLECTION

	No Evidence 0	Beginning 1 - 4	Developing 5 - 9	Accomplished 10
CRITERIA: Deep reflection on professional growth	No evidence of reflective thought about effect on professional growth	Slight evidence of reflective thought about effect on professional growth	Evidence of reflective thought about effect on professional growth	Evidence of deep reflective thought about effect on professional growth
CRITERIA: Deep reflection on possible changes in student mathematical growth if ideas expressed in class or article are implemented	No evidence of reflective thought about effect on mathematical growth of students	Slight evidence of reflective thought about effect on mathematical growth of students	Evidence of reflective thought about effect on mathematical growth of students	Evidence of deep reflective thought about effect on mathematical growth of students
CRITERIA: Knowledge of class or reading	No references to any activities in class or statements in articles	Few, if any, references to any activities in class or statements in articles	Some references to activities in class or statements in articles	Many references to activities in class or statements in articles