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GEORGE MASON UNIVERSITY (GMU)
COLLEGE OF EDUCATION AND HUMAN DEVELOPMENT (CEHD)
Division of Elementary, Literacy, and Secondary Education

EDPD502.624: Inquiry-Based Mathematics Instruction in Grades 3-8
Fall/2013

Mondays/ 4:30 – 7:30
September 16 – December 16, 2013
Kelly Leadership Center, room 2002
Prince William County Schools

Instructor: *Donna Stofko*

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COURSE DESCRIPTION:

Focusing on place value, multiplication, division, fractions, decimals, and percent, this course empowers teachers to teach mathematics for understanding using a variety of strategies to support a range of learners in an elementary or middle school 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. The intended audience is teachers or administrators at the elementary and middle school level.

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.

STUDENT OUTCOMES:

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.
- Focus their attention on strategies students use to solve problems.
- Shift their focus from teacher activities to student learning.

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- Increase their own content knowledge of the mathematics they teach at the elementary and middle school level.
- Learn strategies to teach, remediate, and enrich the concepts of place value, multiplication and division, fractions and decimals.

REQUIRED/SUPPLEMENTAL/RECOMMENDED TEXTS AND/OR READINGS:

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*.

COURSE 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

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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.

GMU POLICIES AND RESOURCES FOR STUDENTS

- a. Students must adhere to the guidelines of the George Mason University Honor Code (See <http://oai.gmu.edu/honor-code/>).
- b. Students must follow the university policy for Responsible Use of Computing (See <http://universitypolicy.gmu.edu/policies/responsible-use-of-computing/>).
- c. Students are responsible for the content of university communications sent to their George Mason University email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students solely through their Mason email account.
- d. The George Mason University Counseling and Psychological Services (CAPS) staff consists of professional counseling and clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops and outreach programs) to enhance students' personal experience and academic performance (See <http://caps.gmu.edu/>).
- e. Students with disabilities who seek accommodations in a course must be registered with the George Mason University Office of Disability Services (ODS) and inform their instructor, in writing, at the beginning of the semester (See <http://ods.gmu.edu/>).
- f. Students must follow the university policy stating that all sound emitting devices shall be turned off during class unless otherwise authorized by the instructor.

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- g. The George Mason University Writing Center staff provides a variety of resources and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing (See <http://writingcenter.gmu.edu/>).

PROFESSIONAL DISPOSITIONS

Students are expected to exhibit professional behaviors and dispositions at all times.

CORE VALUES COMMITMENT

The College of Education & Human Development is committed to collaboration, ethical leadership, innovation, research-based practice, and social justice. Students are expected to adhere to these principles: <http://cehd.gmu.edu/values/>.

PRINCE WILLIAM COUNTY SCHOOLS MATH DEPARTMENT STATEMENT OF RESPONSIBILITY:

Teachers taking graduate level classes paid for by the PWCS Math 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.

Class Schedule

Inquiry-Based Mathematics Instruction in Grades 3-8

Class	Date	Topic	Readings/Assignments (for the next class)
1	9/16	<ul style="list-style-type: none"> • Course Introduction • Number Sense 	Math Matters – Ch. 1, pp.1-6 (top), pp. 9- 11, pp. 13 (bottom) – pp. 30 Ch. 2 pp. 31-48
2	9/23	<ul style="list-style-type: none"> • Number Sense • Assessment #1: Place Value 	Video Assessment #1 (Place Value) Math Matters - Ch. 3 pp. 55-67 Accessible Mathematics – Ch. 1 and 2
3	9/30	<ul style="list-style-type: none"> ▪ Computational Fluency: Addition and Subtraction ▪ View and discuss video 1 	Ch. 3, pp. 68-75 Accessible Mathematics – Ch. 3
4	10/7	<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. 2, pp. 49-55, Ch. 4 Accessible Mathematics – Ch. 4
5	10/14	<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 – Ch. 5
6	10/21	<ul style="list-style-type: none"> ▪ View and discuss multiplication and division videos ▪ Computational Fluency - Multiplication 	Math Matters –begin reading Ch. 5 p. 99 – through Activity 10, p. 121. Accessible Mathematics – Ch. 6
7	10/28	<ul style="list-style-type: none"> ▪ Computational Fluency - Division ▪ Fractions (number sense) ▪ Assessment #3: Fractions 	Video Assessment #3 (Fractions) Math Matters – remainder of chapter 5 Accessible Mathematics – Ch. 7
8-9	11/2 (Sat.)	BNVCTM conference	Reflection of conference (due 11/18)
10	11/4	<ul style="list-style-type: none"> ▪ View Fractions assessments ▪ Fractions (addition and subtraction) 	Article Accessible Mathematics – Ch. 8
11	11/18	<ul style="list-style-type: none"> ▪ Fractions (multiplication and division) 	Math Matters - Ch. 6 Accessible Mathematics – Ch. 9
12	11/25	<ul style="list-style-type: none"> ▪ Decimals 	Math Matters – Ch. 7 Accessible Mathematics – Ch. 10 Draft of Inquiry-based lesson plan
13	12/2	<ul style="list-style-type: none"> ▪ Percent 	Math Matters – Ch. 8 Accessible Mathematics – Ch. 11
14	12/9	<ul style="list-style-type: none"> ▪ Ratios 	Accessible Mathematics, pp. 72-113
15	12/16	<ul style="list-style-type: none"> ▪ Lesson Presentations 	

ASSIGNMENT RUBRIC

	No Evidence 0	Beginning 1	Developing 2	Accomplished 3
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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 the reading 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 content and mathematical reasoning in solving problems within the assigned reading	No references to any activities within the assigned reading.	References to few of the activities within the assigned reading.	References to some of the activities within the assigned reading.	References to most/ many of the activities within the assigned reading.
	Not Satisfactory 0			Satisfactory 1
CRITERIA: Writing is coherent, free of errors, and follows style guidelines outlined in the syllabus	Written work is not coherent, has some errors, or does not follow style guidelines outlined on the syllabus.			Written work is coherent, has few or no errors, and does follow style guidelines outlined on the syllabus.