

GEORGE MASON UNIVERSITY (GMU)
COLLEGE OF EDUCATION AND HUMAN DEVELOPMENT (CEHD)
DIVISION ELEMENTARY, LITERACY AND SECONDARY EDUCATION

EDPD502: Learning and Doing Mathematics in Grades 6-8

EDPD 502.6R7 - Fall 2015

Kelly Leadership Center, Room 2002-2004

Prince William County Schools

Co-Instructor: *Kathleen Judge*

Phone: 703.791.8849

Email: judgekm@pwcs.edu

Address: PO Box 389, Manassas, VA 20108

Co-Instructor: *Nakasha Kirkland*

Phone: 703.791.8849

Email: kirkkans@pwcs.edu

Address: PO Box 389, Manassas, VA 20108

Course Description

Learning and Doing Mathematics in Grades 6-8 is based on the principles of teaching mathematics through investigation and discovery. During this class, teachers will learn research-based methods for teaching mathematics for understanding. The primary focus for 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.

Teachers are offered opportunities to struggle with complex, rich, and expandable mathematical tasks. Collections of tasks are chosen to help participants develop a deep understanding of some of the fundamental ideas in mathematics and build confidence in mathematical problem solving. During the course, teachers are engaged in inquiry-based mathematics investigations in both group and individual settings. A variety of manipulatives (including color tiles, pattern blocks, interlocking cubes, Cuisenaire rods, Base Ten blocks, computer, document camera) are available to establish patterns and aid teachers' understanding. The instruction in the course is designed to further teachers' conceptual understanding, procedural fluency, and strategic competence in mathematics while modeling the pedagogy proven to be effective at leading to mathematical understanding in students.

Course Purpose and Intended Audience

Results of national and international tests in mathematics achievement point to the need of reform in mathematics education for middle school students. This course is designed to increase teachers' knowledge of middle grades mathematics and the hierarchy of sophistication of children's strategies in place value of real numbers, operations with fractions, integers, and decimals, and other related topics.

Course Format

Class sessions are structured for maximum teacher participation. Each class focuses on a discussion of current mathematical ideas and assigned readings. The focus of the mathematical content will be based on the readings assigned. Mathematical problems, activities, and lessons supporting these concepts are modeled, practiced, and discussed.

Course Objectives

Teachers will

- Focus their attention on strategies students use to solve problems.
- Shift their focus from teacher activities to student learning.
- Increase their own content knowledge of the mathematics they teach at the middle school level.
- Learn strategies to **teach, remediate, and enrich** the concepts of
 - number sense within the Real Number System,
 - operations with fractions, decimals, and integers,
 - ratios, percents, and proportional reasoning,
 - probability and statistics,
 - geometry and measurement, and
 - Algebra.

Required Texts and Supplemental Readings

Required Texts: *Math Matters*, by Suzanne H. Chapman and Art Johnson
Accessible Mathematics, by Steven Leinwand

Supplemental Readings:

Selected articles may be presented pertaining to middle school math topics and instruction from a variety of sources, including *Teaching Children Mathematics*, *Journal for Research in Mathematics Education*, *Educational Leadership*, *Mathematics in the Middle School*.

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 as assigned and participate in all discussions and activities related to those readings. (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.
 - c. Attendance required for the BNVCTM Fall Conference on Saturday, November 7, 2015.

2. **Weekly Reflections:** Read, reflect, and respond to all reading assignments. (10/11 points each)
- 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 by references from the chapter. Activities in *Math Matters* are to be explored independently and noted as part of the reflection. See attached rubrics for *Math Matters* and *Accessible Mathematics* assignments.
 - Weekly Reflections will be submitted electronically
 - To **both** instructors through Outlook email
 - No later than the following Tuesday by noon
 - Reflection Format:
 - Header includes name and assigned reading (see example)
 - At least 350 words
 - Font type – Calibri or Times New Roman
- | |
|--------------------------------------|
| (header) |
| Mary Jo Smith <u>MM</u> Ch6 Decimals |
3. **Inquiry-Based Lesson Project:** Choose a topic/concept, write an inquiry-based lesson to teach the topic/concept, write a summary reflection upon completion of teaching the lesson, and gather student work samples to support lesson reflection. (25 points)
- Expectation:** Lesson plan will be written using the Standards Based Lesson Plan template or similar. Summary reflection 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 (as in, what was surprising or what would need to be done differently if this lesson would be taught again). Summary reflection should also include references to student work. See attached rubric.
 - Each teacher will present their lesson plan (including student work samples) and summary to classmates during Class 14 or Class 15.
4. **Math Happenings:** Collaborate with at least one other classmate to present a recent math article or math resource for the approximately 10 minutes of class time. (5 points)
- Expectation:** Each teacher will sign up for a class date with at least one other classmate. Together, the teachers will collaborate on a topic or theme. The short presentation could include a book or an article read, a new website discovered that would be good for the group to explore, an idea for an activity for a specific topic in the curriculum, a classroom activity you have observed or have used in your classroom, or anything related to math or math instruction!!!
 - Each teacher should equally share the talking time in front of the group.
 - Handouts are optional.
5. **Math Reasoning Inventory (MRI):** Administer the inventory for Whole Numbers, Decimals, and Fractions to one student. (10 points each)
- Expectation:** Teachers will learn about these assessments in class and administer each one to a student. Print the inventory report to be turned in on due date.

- b. On the due date, each teacher will share insights gained from the assessment and next steps planned for the student. Teachers will turn in the inventory report.

Formula for Grading

Percentages are based on the **total points possible** throughout the course.

A – 90% - 100%

B – 80% - 89%

C – 70% - 79%

F – BELOW 70%

NOTE: Assignments will be accepted up to one week late without penalty.

Late assignments should be sent to **both** instructors through Outlook email.

For assignments turned in more than a week late, assessment will begin with a 10% penalty.

GMU 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 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 SCHOOL 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 catalog will not be permitted to take any other class paid for by the Mathematics Office. Dropping a class from the online catalog 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 6-8

CLASS	DATE (Tue.)	TOPIC	ASSIGNMENT for NEXT CLASS
1	9-8	Course Introduction and Syllabus Introduction to MRI and the Whole Number Inventory Begin Accessible Math : Jigsaw: Introduction and Chapter 1; teacher personal reflection on current teaching practices	Read: Acc Math , Ch. 2 – 6 (pp.6-38) Write: personal reflection on reading Register on MRI website Administer MRI : Whole Number Inventory (Due 9-22-15)
2	9-15	Math Happenings Acc Math , Ch. 2 – 6 (<i>Shifts 1-5</i>) 5E's Task Time	Read: Acc Math , Ch. 7-11 (pp. 39-71) Write: personal reflection on reading
3	9-22	Math Happenings Debrief : MRI Whole Number Inventory Discuss Acc Math , Ch. 7-11 (Shifts 6-10) Inquiry-Based Teaching (Include video of S.A./Volume class OR Marilyn Burns DVD) Task Time	Read: Acc Math , Ch. 12, 13 & Appendices (pp. 72-113) Write: personal reflection on reading Administer MRI : Decimal Inventory (Due 10-6-15)
4	9-27	Math Happenings Discuss Acc Math , Ch. 12, 13 & Appendices Lesson Plan Project (with template and sample lessons) Math Matters –Ch. 1 (jigsaw activity) Task Time	Read: M M Number Sense: Ch.5 Fractions Sec.1 & 2: 99-121; Ch. 6 Decimals Sec.1 & 2: 133-143; Ch.7 Percents Sec.1: 149-156. Write: personal reflection on reading
5	10-6	Math Happenings Debrief : MRI Decimal Inventory Number Sense for fractions, decimals, and percents: activities with manipulatives- money, base ten blocks, Cuisenaire rods, fraction match, etc. Task Time	Read: M M Computation: Ch.5 Sec.3: 121-132; Ch. 6 Sec.3: 143-148. Write: personal reflection on reading Administer MRI : Fraction Inventory (Due 10-20-15)
6	10-13	Math Happenings Computation for fractions and decimals Task Time	Read: M M , Ch.7 Percents Sec.2: 157-163; Ch.8 Ratios: 165-189. Write: personal reflection on reading
7	10-20	Math Happenings Debrief: MRI Fraction Inventory Percents and Ratios Task Time	Read: M M , Ch. 9 Algebra: 191-219. Write: personal reflection on reading

CLASS	DATE (Tue.)	TOPIC	ASSIGNMENT for NEXT CLASS
8	10-27	Math Happenings Algebra	Read: <u>M M</u> , Ch. 10 Geometry: 220-247. (section 6 is optional) Write: personal reflection on reading (due 11-10-15)
X	11-3	***** NO CLASS *****	**** NO CLASS ****
9 and 10	Sat., 11-7	BNVCTM Fall Conference (Attendance Required)	Write: personal reflection on your 3 breakout sessions; Due NLT 11-17
11	11-10	Math Happenings Geometry Task Time	Read: <u>M M</u> , Ch. 11 Spatial Sense: 248-270. Write: personal reflection on reading ***BNVCTM reflection due NLT 11-17
12	11-17	Math Happenings Spatial Sense Task Time	Read: <u>M M</u> , Ch. 12 Measurement: 271-293. Write: personal reflection on reading
13	11-24	Math Happenings Measurement Task Time	Read: <u>M M</u> , Ch. 13 Statistics: 294-321. Write: personal reflection on reading
14	12-1	Math Happenings Statistics Lesson Presentations – first half Task Time	Read: <u>M M</u> , Ch. 14 Probability: 322-339. * No reflection due for this reading Write: 2-page reflection on this class
15	12-8	Math Happenings Probability Lesson Presentations – second half GMU Course Evaluations	☺

Grading Rubric for Reflections on Math Matters reading assignments

	No Evidence 0	Beginning 1	Developing 2	Accomplished 3
Criteria: 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: Reflection on possible student mathematical growth if ideas expressed in reading are implemented.	No evidence of reflective thought about effect on student mathematical growth .	Slight evidence of reflective thought about effect on student mathematical growth .	Evidence of reflective thought about effect on student mathematical growth .	Evidence of deep reflective thought about effect on student mathematical growth .
Criteria: Knowledge of content and mathematical reasoning in working through the math activities within the assigned reading.	No references to any of the math activities within the assigned reading.	References to few of the math activities within the assigned reading.	References to some of the math activities within the assigned reading.	References to most/many of the math activities within the assigned reading.
	Not Satisfactory 0			Satisfactory 1
Criteria: Writing is coherent, free of errors, and follows guidelines outlined in syllabus.	Written work is not coherent, has some errors, or does not follow guidelines outlined in syllabus.			Written work is coherent, has few/no errors, and follows guidelines outlined in syllabus.

COMMENTS:

SCORE: _____ /10

Grading Rubric for Reflections on Accessible Mathematics assignments

	No Evidence 0	Beginning 1-2	Developing 3-4	Accomplished 5
Criteria: 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: Reflection on possible student mathematical growth if ideas expressed in reading are implemented.	No evidence of reflective thought about effect on student mathematical growth .	Slight evidence of reflective thought about effect on student mathematical growth .	Evidence of reflective thought about effect on student mathematical growth .	Evidence of deep reflective thought about effect on student mathematical growth .
	Not Satisfactory 0			Satisfactory 1
Criteria: Writing is coherent, free of errors, and follows guidelines outlined in syllabus.	Written work is not coherent, has some errors, or does not follow guidelines outlined in syllabus.			Written work is coherent, has few/no errors, and follows guidelines outlined in syllabus.

COMMENTS:

SCORE: _____ /11

Grading Rubric for Inquiry-Based Lesson Project

	No Evidence 0	Beginning 1-3	Developing 4-7	Accomplished 8
Criteria: Inquiry-Based Lesson Plan	Lesson plan does not include any of the 5E's; lesson is not inquiry-based.	Lesson plan includes few of the 5E's; lesson is partially inquiry-based.	Lesson plan includes most of the 5E's; lesson is mostly inquiry-based.	Lesson plan includes all of the 5E's; lesson is totally inquiry-based.
Criteria: Lesson Summary (written)	No evidence of reflective thought about lesson delivery and student responses.	Slight evidence of reflective thought about lesson delivery and student responses.	Evidence of reflective thought about lesson delivery and student responses.	Evidence of deep reflective thought about lesson delivery and student responses.
	No Evidence 0	Beginning 1-2	Developing 3-4	Accomplished 5
Criteria: Presentation of Lesson Summary to Classmates: informal discussion of following components: lesson objective, evidence of 5E's in lesson, planned activity, sharing student work/assessment, reflection on next steps for students or repeating the lesson (what worked/did not work)	No informal presentation.	Informal lesson explanation includes few components.	Informal lesson explanation includes some components.	Informal lesson explanation includes all components.
	Not Satisfactory 0			Satisfactory 2
Criteria: Writing is coherent, free of errors, and follows guidelines outlined in syllabus.	Written work does not meet the criteria.			Written work meets the criteria.
Criteria: Student work samples	Student work samples were not included in the informal presentation.			Student work samples were included in presentation.

COMMENTS:

SCORE: _____ /25