EDCI 855: Mathematics Education Research on Teaching and Learning
Fall 2010

Professor:
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Meeting Times: First Saturday of the month (September – May, no January class)
Location: Commerce II Room 100
Description: (3 credit hours) Yearlong seminar; students survey most current research literature in mathematics education and engage in research, study, and discussion on teaching and learning in school settings. Prerequisite: admission to mathematics education leadership PhD program.

Required Textbooks:

Carpenter, T. P., Dossey, J. A., & Koehler, J. L. (2004). *Classics in mathematics education research*. Reston, VA: National Council of Teachers of Mathematics.
Lester, F. (2008). *Second handbook of research on mathematics teaching and learning*. Charlotte, NC: Information Age Publishing.

Student Outcomes

At the conclusion of the course students should be able to:
1. Analyze and reflect on mathematics education research related to student learning.
2. Understand major theoretical positions in mathematics education.
3. Explain the development of theories of mathematics education.
4. Begin to conduct mathematics education research.

Relationship to Program Goals and Professional Organization

EDCI 855 is designed to enable mathematics education leaders to identify, develop and use instructional strategies consistent with the key attributes of effective professional development experiences for mathematics teachers. The course was developed according to the joint position statement of the Association of Mathematics Teacher Educators and the National Council of Teachers of Mathematics, *Principles to Guide the Design and Implementation of Doctoral Programs in Mathematics Education*. This position statement indicates that the core knowledge expectations for doctoral study in mathematics education include:

- Participate in mentored clinical experiences that develop expertise in designing and teaching mathematics content and methods courses for teachers,
- Organize and teach professional development experiences for practicing teachers,
- Demonstrate knowledge about research on teaching and teacher education,
- Articulate knowledge of historical, social, political and economic factors impacting mathematics education,

- Become familiar with reports from major commissions, committees, and professional organizations,
- Help practicing teachers acquire knowledge of research on teaching and translate it to their own practice,
- Demonstrate confidence and competence in choosing and using effective instructional strategies consistent with mathematics learning goals, and
- Critically reflect about one's own teaching.

Performance-Based Assessments

1. *Curriculum Vitae* – Submit a copy of your CV. For samples, you can visit CEHD faculty web pages to find their CVs. http://web.mit.edu/career/www/guide/cv.pdf is guide to CV writing and provides additional links.

2. *Mathematics Knowledge and Understanding Review* – Submit a 20-page paper reviewing the research literature related to a particular mathematics topic. The review should include references from peer-reviewed journals and books describing the development of students' understanding and how various researchers have examined the topic.

3. *Position Paper* – Compare and contrast two positions in mathematics education (e.g., Behaviorism vs. Constructivism, problem-based learning vs. drill and practice, using calculators vs. paper-based activities) examining the fundamental tenets and propositions of each position. Describe the strengths and weaknesses of each position. Your arguments should be supported by literature from the field.

4. *Clinical Interview* – Find 3 students or adults and create a problem set to provide them during a clinical interview session about their understanding of a particular mathematical topic. Write a 5-10 page analysis of the interview results. What were their struggles? What concepts do they understand? Part of your work as a mathematics educator and researcher involves conducting interviews and understanding how people think about mathematics. This assignment is intended to help you develop both of these skill sets.

Assignment	Points
Curriculum Vitae	50
Mathematics Knowledge and Understanding Review	200
Position Paper	200
Clinical Interview	200
Class Participation	150
TOTAL	800

Formatting Assignments

All papers should follow the guidelines in the *Publication Manual of the American Psychological Association (6ᵗʰ Ed.)* for formatting reference lists, citations, the body of the paper, etc. As most classes and your dissertation will require APA 6ᵗʰ formatting, I strongly recommend purchasing the APA 6ᵗʰ Handbook.

Late Assignments

All assignments are due on the date listed in the schedule. Papers should be submitted

GRADE	POINTS
A	720+
B	640-719
C	560-639
F	Less than 559

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.

Approved March 2004

Course Schedule

Date	Readings Due	Assignments Due
September 4, 2010	Skemp Bruner Dewey	
October 2, 2010	Common Core Standards (see link on Bb) Erlwanger (CME) Vergnaud (CME) Verschaffel et al (HRMTL, 13) Lamon (HRMTL, 14)	CV Clinical Interview Problem Set
November 6, 2010	Fennema & Sherman (CME) Bishop & Forgasz (HRMTL, 26) Carraher & Schliemann, (HRMTL, 15) Kieran (HRMTL, 16)	
December 4, 2010	Brownell (CME) Kilpatrick (CME) Schoenfeld (CME) Lesh & Zawojewski (HRMTL, 17)	Clinical Interview Paper
February 5, 2011	Steffe & Kieran (CME) Cobb & Yackel (CME)	
March 5, 2011	vanHiele (CME) Battista (HRMTL, 19) Clements & Sarama (HRMTL, 12)	Math Knowledge Paper (due Feb 28)
April 2, 2011	Tall & Vinner (CME) Harel & Sowder (HRMTL, 18) Artigue et al (HRMTL, 22)	
May 14, 2011 NOTE DATE CHANGE	Carraher et al (CME) D'Ambrosio (CME) Diversity, (HRMTL, 10)	Position Paper

CME=*Classics in Mathematics Education Research*
HRMTL, ## = *Second handbook of research on mathematics teaching and learning,*
    Chapter XX

Blackboard site:
All assignments and supplemental readings will be available on the course Blackboard site (https://gmu.blackboard.com). All students enrolled in the course are enrolled in the Blackboard site. Use your Mason email login and password to enter the site.

NOTE: All assignments and readings are subject to change at the discretion of the instructor. Any changes will be announced in class and posted on the course Blackboard site