

MSED 591 Research Foundations of Mathematics & Science Education
June 21, July 2, 9, 16, 23, 30 1:00-4:30 WS2609 (Seaborg Resource Room)

Instructor

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Prerequisite

Prior to taking this seminar, students shall have completed at least half the requirements of the MSME/MSSE degree, including at least half the major (MSED) courses.

Course Goals

- A. To become more knowledgeable about and more critical readers of mathematics and science education research literature
- B. To use the implications of research findings for changing teaching practices in mathematics and science
- C. To develop a proposal for your master's thesis or project

Course Requirements

- A. Read research articles in science/mathematics education. Come to class prepared to discuss, question, and share ideas. *You will need frequent access to a computer and the Web.*
- B. For each article assigned, prepare a thoughtful summary (approximately one typed page) that includes the following:
 - 1. Things I learned or clarified from reading the report.
 - 2. Questions that can be asked about the research design or implications.
 - 3. The importance of the reading for me and my teaching
- C. Take responsibility for leading one discussion on a selected area of science/mathematics education research (see topics under "Content Outline and Readings).
- D. Identify a topic that might become the focus of your thesis/project.
 - 1. Present your ideas to the class and lead a discussion/critique (aimed at formulating and refining the problem)
 - 2. Submit a paper that includes:
 - a) Statement and significance of the problem
 - b) Review of the literature
 - c) Proposed plan of action
- E. **Purchase a copy of a writer's manual.** Use it to help write papers for the course and your master's project/thesis. I.e. MLA HANDBOOK FOR WRITERS OF RESEARCH PAPERS

Course Grade

Course grading is A through F. The grade is based on the papers (40%), class participation (30%), and the proposal for your project or thesis (30%).

1. You must turn in all papers (computer printed) on schedule. Papers must have good grammar and correct spelling. Late papers will lose credit: Same day: 10% deduction; Next day: 25% deduction
2. You must attend all six sessions and participate fully. Any non-emergency or unexcused absence will automatically reduce your earned letter grade for the course by one level. ie. An A- will drop to a B+.

Content Outline and Readings

A. Background: On research in mathematics and science education

1. Coburn. "Criteria for Judging Research Reports and Proposals."
2. Begle and Gibb. "Why Do Research?"
3. Johnson. "Types of Research."
4. Sowder. "The State of Research in Mathematics Education."

B. Research on learning Mathematics and Science

1. JRME-25: Kieran article (p. 583)
2. General Ref. 2: Lawson article (p. 131)

C. Research on mathematics/science teaching and teachers

1. JRME-25: Cooney article (p.608)
2. General Ref. 2: Tobin, Tibbins, Gallard article (p.45)

D. Special topics

1. Research on affect (attitude, self-concept, motivation, etc.) in learning mathematics and science
JRME-25: McLeod article (p. 637) General Ref. 2: Simpson, et al. article (p. 211)
2. Research on gender differences in mathematics/science education
JRME-25: Fennema and Hart article (p. 648) General Ref. 2: Kable and Meece (p. 542)
3. Research on technology in mathematics/science education
JRME-25: Kaput and Thompson article (p. 676)
NSTA: *What Research Says to the Science Teacher*, Vol. 7, "The Science, Technology, Society Movement".
4. Research on problem solving in mathematics and science
JRME-25: Lester article (p. 660)
NSTA: *What Research Says to the Science Teacher*, Vol. 5, "Problem Solving".

General References

1. *Handbook of Research on Mathematics Teaching and Learning*. Macmillan Pub. Co., 1992. **(On two hour reserve in Olson Library.)**
2. *Handbook of Research on Science Teaching and Learning*. Macmillan Pub. Co., 1994. **(On two hour reserve in Olson Library.)**
3. *Journal of Research in Mathematic Education*. NCTM. Copies will be available in the Seaborg Media Center. They must be checked out and returned.
4. *Journal of Research in Science Teaching*. NSTA.
5. *School Science and Mathematics*. SSMA journal. (Not all articles in here are research reports.)

