Mathematics Curriculum Research and Evaluation

Western Michigan University (Math 657 III)
University of Missouri (C&I 8900)
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Previous/Prerequisite Courses

Math 657 I, *Mathematics Curriculum Issues and Trends*, focused primarily on the ideal and intended curricula during significant periods of school mathematics history. Students developed their understanding of this history through collaborative work with University of Missouri graduate students by jointly producing Power Point and written summaries associated with major curriculum conference reports and recommendations published during the last century. Those products are now available as references on the CSMC website.

The 657 II course, *Mathematics Curriculum Design and Analysis,* focused on helping doctoral students develop the knowledge, skills, and dispositions useful in the design, development, and analysis of school mathematics curriculum materials. A central feature of the course was the careful examination of contemporary intended curricula, both standard and innovative, from mathematical content, pedagogical design, and development perspectives. Past and future implications of technology as it relates to curriculum design were also considered. Students demonstrated their understanding through power point presentations, written reflective papers focused on current design research, and completing a project that required them to apply design principles (articulated in the research articles and discussed in class) to develop a lesson within a chosen grade level. Guest speakers offered unique perspectives on curriculum design issues on three occasions.

Course Overview and Goals

This course deals with the enacted and attained curriculum as seen through research and evaluation lenses. A number of themes begun in the previous courses will be investigated more deeply, however our main goals are the following:

Main Goals:

- Develop an understanding of basic evaluation tools and approaches, and those unique to the study of school mathematics curricula.
- Develop an understanding of research techniques associated with evaluating curricula from a variety of perspectives.

- Examine curriculum evaluation evidence and claims of effectiveness in light of evaluation and research limitations and bias.
- Develop the ability to critique evaluation methodologies and research articles for which curriculum evaluation is a substantial component.
- Engage in conversations with leading curriculum evaluators to gain a deeper understanding of the variety of approaches to evaluation and related research.
- Develop the ability to design a simple, yet quality, curriculum evaluation.
- Discuss the impact and implications of curriculum evaluation research and results in terms of curriculum design, implementation, and educational and policy-related decision-making at local, state, and national levels.

Textbooks and Other Readings

Senk, S. L. & Thompson, D. R. (Eds.). (2003). *Standards-based school mathematics curricula: What are they? What do students learn?* Mahwah, NJ: Lawrence Erlbaum.

National Research Council; [Confrey, J. & Stohl, V. (Eds.)]. (2004). *On evaluating curricular effectiveness: Judging the quality of K-12 mathematics evaluations*. Washington, DC: National Academy Press.

Worthen, B.R. & Sanders, J.R. (1987). *Educational Evaluation: Alternative Approaches and Practical Guidelines*. New York: Longman.

Chapters from other books and handbooks, reports and journal articles will be assigned periodically.

In addition, from time to time you may need or see references in the evaluation literature that you want to investigate further and texts that are too costly to purchase for a single course. Some of these I have purchased and they will be available in Hope's office for use as you need them (others may be in my office, so just ask). For example, *The Program and Evaluation Standards* (1994) and the *Encyclopedia of Evaluation* (2005) are books we have in hand.

Course Requirements and Format

There are several required components to this course. You are expected to fully complete each one.

1. *Reading, Writing, and Presentation Assignments*—Specific readings will be assigned for each session. You should come to class having read the assigned material thoroughly and thoughtfully. For *each* assigned set of readings, you are to develop two discussion questions. The questions should be sent to all course participants via email no later than Sunday evening prior to the Tuesday class. Active participation in class discussion of all readings is expected. Each student will be asked to lead a discussion of assigned readings at some time during the semester. Several short writing assignments will be given throughout the semester in which you will be asked to synthesize your understanding of the assigned readings. From time to time you will be assigned to do a power presentation, as was

done in the previous courses. We will discuss the particulars as we get to them. Some of these may be joint ventures with MU graduate students.

2. *Project*—This semester you will be asked to contribute to an annotated list of evaluation resources that will culminate in a single product available on CD (and the web). This will be similar to the one compiled and used in the Curriculum II course (described earlier for WMU students). Each student will be responsible for contributing a minimum of **four** resources to be eligible for a C in this course. Additional details of your role in this piece will be given during class.

3. *Written Critiques and Final Exam*—Toward the end of the semester you should be in a position to thoughtfully critique evaluation-related articles. You will be asked to write and react to others' critiques and this component will also form the basis for the final exam. Details of how this will be orchestrated will be given during class.

Mathematics Curriculum Evaluation and Research
Week 1

Agenda

In class (1/10/06)

1) Welcome and introductions.

2) Complete calendar problems.

3) Discussion Task #1. Small and whole group discussion.

4) Discussion of syllabus and course expectations.

For Tuesday (1/17/06)

1) Read: Chapters 1-4 (to p. 62) from Educational Evaluation.

2) Read: Your Assigned Chapter (from 5-11 in EE) and begin preparing a 15-minute Power Point presentation for your assigned chapter. Possibly ready next week?

3) Read: *Cautions and Considerations: Thoughts on the Implementation and Evaluation of Innovation in Science Education*. (by S. Cooper). Chapter 30 from the Handbook of Research Design in Mathematics and Science Education.

4) As you read these introductory chapters, you should investigate some of the references to the vast amount of evaluation literature that might be good candidates for discussion and possible inclusion in the course annotated bibliography. See the syllabus for this part of the course requirement.

Mathematics Curriculum Evaluation and Research
Week 2

Agenda

In class (1/17/06)

1) Discussion of Worthen/Sanders chapters 1-4. Discussion of submitted questions. Revisit task question from last week. Discuss the Cooper article as needed.

2) Introduction to Evaluation Approaches (Chapters 5-11). Naturalistic and Participant-Oriented Approaches (Steve, ppt.). Others?

3) Discussion of Annotated Resources for this course. Revisit the course requirement.

For Tuesday (1/24/06)

1) Read: Chapters 12-16 (p. 162 to p. 267) from Educational Evaluation. Also read one additional approach that you weren't assigned.

2) Prepare a short PPT presentation on your assigned approach as preparation for leading a discussion. The presentation should include the following:

Discuss the model: 1) Goals/Purposes; 2) Identifying Features; 3) History and Advocates; 4) Strengths and Weaknesses; 5) Compare and Discuss the model against other approaches; 6) Possible links to Curriculum Evaluation

3) Read: The Methodology of Evaluation (M. Scriven). From the *AERA Monograph Series on Curriculum Evaluation: (Volume 1) Perspectives of Curriculum Evaluation*.

4) Continue to investigate references in the evaluation literature that might be good candidates for discussion and possible inclusion in the course annotated bibliography.

Mathematics Curriculum Evaluation and Research
Week 3

Agenda

In class (1/24/06)

1) Future planning and announcements.

2) PPT Presentations on Evaluation Approaches. Summary of evaluation approaches (Chapter 11).

3) Discussion of Worthen/Sanders chapters 12-16. Discussion of submitted questions. Revisit task questions from Week 1. Begin discussing Scriven's chapter on Evaluation Methodology (see handout for today).

4) Revisit discussion of Annotated Resources for this course. Revisit the course requirement.

For Tuesday (1/31/06)

1) Read: Chapters 17-20 (p. 279 to p. 366) from Educational Evaluation. Also read one additional approach that you weren't assigned. And you can read the end of the Application Example (Radnor) beginning on p. 383.

2) Read: Curriculum Research and the Promotion of Learning (R. Gagne) and Aspects of Curriculum Evaluation: A Synopsis (J. S. Almann). From the *AERA Monograph Series on Curriculum Evaluation: (Volume 1) Perspectives of Curriculum Evaluation*. You are welcome to read the other chapters in this volume as interest and time permits. (You have read most of it and a copy is in Hope's office.)

3) Identify and locate copies of at least two references in the evaluation literature that might be good candidates for discussion and possible inclusion in the annotated course bibliography. Bring them to class and be prepared to discuss your rationale for choosing them.

Mathematics Curriculum Evaluation and Research
Week 4

Agenda

In class (1/31/06)

1) Future planning and announcements.

2) Summary of evaluation approaches (Chapter 11). Discussion of Worthen/Sanders chapters 12-20. Begin discussing Scriven's chapter on Evaluation Methodology and other chapters from the AERA Monograph Series (see handout for today).

3) Further discussion of submitted questions (from the previous two weeks) as needed. Question: What does it mean to evaluate evaluations? What might this look like?

4) Revisit discussion of Annotated Resources for this course and the two references you were to bring with you today. Revisit the course requirement.

For Tuesday (2/07/06)

1) Read: Finish any readings you haven't gotten to from Educational Evaluation. This might include any additional approaches that you weren't assigned, but perhaps you don't understand well enough.

2) Read: Chapter 21 from Educational Evaluation.

3) Read: The other "takes" on the Radnor Evaluation. From Applied Strategies for Curriculum Evaluation (R. S. Brandt, ed. 1981)

4) Read: Chapters 1-3 of the NRC Report.

5) Work on your piece of the annotated course bibliography.

Mathematics Curriculum Evaluation and Research
Week 5

Agenda

In class (2/07/06)

1) Future planning and announcements.

2) Finish the discussion of Annotated Resources for this course and the two references you were to bring with you today. Revisit the course requirement.

3) Begin discussing Scriven's chapter on Evaluation Methodology and other chapters from the AERA Monograph Series (see handout for today). Also, other "takes" on the Radnor Evaluation.

4) Further discussion of submitted questions (from the previous two weeks) as needed. Question: What does it mean to evaluate evaluations? What might this look like? Begin discussing the NRC Report.

5) Preparation for next week.

For Tuesday (2/14/06)

1) Read: Chapters 4-6 of the NRC Report.

2) Read the Hiebert article from JRME if you haven't done so before.

3) We will arrange to view the Schmidt/Wilson Lecture and use that as the basis for our joint discussion with MU next week. As you view the lecture, come up with some good questions that would keep the discussion moving. Don't be afraid to draw on some of the articles you've read to help formulate these questions. (Next week we will meet at 2:00; location to be announced.)

4) Work on your piece of the annotated course bibliography.

5) Writing Assignment #1 (DUE 2/23/06; 4:00) – Write a short paper in which you discuss the implications and potential contributions to mathematics curriculum studies of at least THREE different evaluation approaches discussed in Worthen and Sanders. For each, discuss where you think they fall within the NRC structure of evaluations by pointing out similarities and differences to the NRC approach to looking at evaluations.

Mathematics Curriculum Evaluation and Research
Week 6

Agenda

In class (2/14/06). Room 3210 Sangren

1) Discussion of the Schmidt/Wilson Video Lecture.

When we are through.

2) Future planning and announcements.

3) Finish the discussion of Annotated Resources for this course and the two references you were to bring with you today. Revisit the course requirement.

No Class next week (Tuesday, 2/21/06).
Writing assignment #1 due Thursday (2/23/06) at 4:00.

For Tuesday (3/07/06)

1) Read: Finish reading the NRC Report. Reread sections that you weren't able to attend to carefully during your first reading.

2) Read: "What Doesn't Work" (Schoenfeld) and the counter responses.

3) Work on your piece of the annotated course bibliography. Bring at least one completed write-up to class.

Mathematics Curriculum Evaluation and Research
Week 7

Agenda

In class (2/21/06)

1) Work day. No class.

Writing assignment #1 due Thursday (2/23/06) at 4:00.

Mathematics Curriculum Evaluation and Research
Week 8

Agenda

In class (3/07/06)

1) Scheduling issues.

2) Pair/group work, then discuss the NRC Report.

3) Discuss "What Doesn't Work" (Schoenfeld) and the counter responses.

4) Share your piece of the annotated course bibliography. Update on other articles you have identified.

For Tuesday (03/14/06)

1) Read: Begin reading the Senk/Thompson book. Read the General Introduction and the Introductions to each of the Grade-Level Sections.

2) Read: Choose one study from the Grade-Level Section that most interests you and, after reading it, prepare a Powerpoint presentation that will serve as the focal point of a discussion you will lead regarding your choice. Be sure that within your report you make links to the NRC Report and the WS book.

3) Work on your piece of the annotated course bibliography. Bring another completed write-up to class.

Mathematics Curriculum Evaluation and Research
Week 9

Agenda

In class (3/14/06)

1) Discussion with Michael Scriven.

As time permits:

2) Begin discussing the Senk/Thompson book. Background information by grade level.

3) Begin powerpoint presentations and related discussions.

4) Share your piece of the annotated course bibliography. Update on other articles you have identified.

For Tuesday (03/21/06)

1) Read: Choose one study from each of the other Grade-Level Sections (other than the one you chose). Look for common evaluation approaches, research methodologies, and evaluation findings across the three grade levels. Be prepared to write about those differences and commonalities on an upcoming writing assignment (#2).

2) Work on joint discussion session related to your assigned NRC methodology.
Content Analysis: Dana and Nesrin; Comparative Studies: Lisa and Karen; Case and Synthesis Studies: Diane with Sandy consulting.

3) Work on your piece of the annotated course bibliography. Bring another completed write-up to class (this should be #3).

Mathematics Curriculum Evaluation and Research
Week 10

Agenda

In class (3/21/06)

1) Attend Moses lunch and Q&A session at 2:00.

For Tuesday (03/28/06)

1) Read: Choose one study from each of the other Grade-Level Sections (other than the one you chose). Look for common evaluation approaches, research methodologies, and evaluation findings across the three grade levels. Be prepared to write about those differences and commonalities on an upcoming writing assignment (#2).

2) Work on joint discussion session related to your assigned NRC methodology. Content Analysis: Dana and Nesrin; Comparative Studies: Lisa and Karen; Case and Synthesis Studies: Diane with Sandy consulting.

3) Work on your piece of the annotated course bibliography. Bring another completed write-up to class (this should be #3).

Mathematics Curriculum Evaluation and Research
Week 11

Agenda

In class (3/28/06)

1) Debrief about Moses talk from last Tuesday.

2) Begin discussing the Senk/Thompson book. Background information by grade level.

3) Begin power point presentations and related discussions.

4) Share your piece of the annotated course bibliography. Update on other articles you have identified. Define and end game for this piece of the course. Send finished products to Hope.

Note the following changes in times and dates for our remaining sessions.

For Thursday (04/06/06) at 2:00

1) Writing Assignment #2: Using as background at least three of the grade level reports you read in Senk/Thompson, write a paper in which you explore common evaluation approaches, research methodologies, and evaluation findings across the three grade levels. You should incorporate any of the readings that have been assigned this semester, or those that you have investigated independently, into your paper as appropriate.

2) Work on joint discussion session related to your assigned NRC methodology.
Content Analysis: Dana and Nesrin; Comparative Studies: Lisa and Karen; Case and Synthesis Studies: Diane with Sandy consulting.

3) Work on your piece of the annotated course bibliography. Bring another completed write-up to class (this should be #3 and #4).

We will meet on Thursday (04/13/06) and Tuesday (04/18/06) at 4:00

Final Exam – The final writing assignment will constitute the final exam. Find one study contained in either the NRC report or Senk/Thompson and write an evaluation critique. Due (04/27/06) by 5:00.

Mathematics Curriculum Evaluation and Research
Week 12

Agenda

In class (4/06/06) at 12:30

1) Continue power point presentations on Senk/Thompson chapters.

2) Begin joint NRC presentations as time permits.

3) Discuss pending schedule changes.

4) Update on the bibliographic articles. Questions related to the end game for this piece of the course. Send finished products to Hope.

5) Writing assignment #2 due today.

Note the following changes in times and dates for our remaining sessions.

For Thursday (04/13/06) at 4:30

1) Work on remaining joint discussion sessions related to your assigned NRC methodology. Content Analysis: Dana and Nesrin; Comparative Studies: Lisa and Karen; Case and Synthesis Studies: Diane with Sandy consulting.

2) Finish your piece of the annotated course bibliography. Bring another completed write-up to class (this should be #3 and #4).

We will meet on Thursday (4:30) and Tuesday (04/18/06) at 4:00

Final Exam – The final writing assignment will constitute the final exam. Find one study contained in either the NRC report or Senk/Thompson and write an evaluation critique. Due (04/27/06) by 5:00.

Mathematics Curriculum Evaluation and Research
Week 13

Agenda

In class (4/13/06)

1) Continue power point presentations on Senk/Thompson chapters.

2) Begin joint NRC presentations as time permits.

3) Update on the bibliographic articles. Send finished products to Hope.

4) Do course evaluations.

For Tuesday (04/18/06) at 4:00

1) Work on remaining joint discussion sessions related to your assigned NRC methodology. Content Analysis: Dana and Nesrin; Comparative Studies: Lisa and Karen; Case and Synthesis Studies: Diane with Sandy consulting. Be sure to read or review the articles/readings that these folks asked you to do as preparation for these discussions.

2) Work on the Final Exam – Find one study contained in either the NRC report or Senk/Thompson and write an evaluation critique. See me if you have questions. Due (04/27/06) by 5:00.

Mathematics Curriculum Evaluation and Research
Week 14

Agenda

In class (4/18/06)

1) Joint NRC presentations:

Content Analysis: Dana and Nesrin
Comparative Studies: Lisa and Karen
Case and Synthesis Studies: Diane with Sandy consulting

2) Update on course requirements. Send finished products to Hope.

For Thursday (04/27/06) by 5:00

1) Work on the Final Exam – Find one study contained in either the NRC report or Senk/Thompson and write an evaluation critique. See me if you have questions.