

## MED 700 Advanced Seminar: Post Secondary Cognitive Processes Spring 1998

### Research on Cognitive Processes and Teaching at the Collegiate Level

**Instructor:** Dr. William Blubaugh

**Office:** 1250 Ross Hall

**Office hrs:** 11:00 - 11:45 T & Th  
2:30 - 3:30 Th and by appointment

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**Primary Texts:** *The Nature of Mathematical Thinking*, Sternberg & Ben-Zeev (eds), Lawrence Erlbaum Associates, 1996.  
*Theories of Mathematical Learning*, Steffe et al (eds), Lawrence Erlbaum Associates, 1996.

**Secondary Texts:** *Advanced Mathematical Thinking*, Tall, Kluwer Academic Pub., 1994.  
*Mathematics and Cognition*, ICMI Study Series, Cambridge, 1990.  
*Cognitive Science and Mathematics Education*, Schoenfeld (ed), LEA, 1987.

### My Thought for this Course:

- ◆ Course Objectives
  1. To study cognitive processes of post-secondary mathematics education.
  2. To become familiar with research in cognition related to the teaching of mathematics.
  4. To identify and critique research in cognition related to the teaching of mathematics.
- ◆ Class time devoted to discussion, presentations, group work, but very little lecture.
  1. First part of class devoted to discussion of common assignment and readings. All participate.
  2. Second part of class devoted to an individual's report or presentation
  3. Each of you will be responsible to develop and organize a report to be presented during the semester, in addition to your project. They will counts as credit toward your course grade.
- ◆ Evaluation based on alternative assessments
  1. Project (1 major - a full term emphasis **or** 2 minor - a half term emphasis each)
  2. Class presentations of project(s) and other report(s).
  3. Assessment on projects, presentations, and class involvement by instructor, peer, and self
  4. Case study of an individual learner: observations with write-up.
  5. No traditional pencil-and-paper testing

**Reference Materials:** Assessable (on loan) from me or from the Michener Library.

1. Skemp's book [The Psychology of Learning Mathematics](#)
2. Lamina's book [Learning & the Nature of Mathematics](#)
3. Proceedings of Annual Meeting for the Psychology of Mathematics Education [From 15th Annual Meeting, Volume 1](#)
  - a. The Role of Technology in Reconceptualizing Functions and Algebra (pp. 47-74)
  - b. Approaching Infinity: A View from Cognitive Psychology (PP. 105-111)
  - c. Epistemology and Cognition of the Integral: Elements of Reproductiveness in Teaching-Learning Situations (pp. 112-118)
  - d. Epistemological Changes in Community Colleges Mathematics Students (pp. 186-173)

From 15th Annual Meeting, Volume 2

- a. Blocking Metacognition During Problem Solving (pp. 12 - 18)
  - b. More than repeated Addition - Assessing and Enhancing Pedagogical Content Knowledge about Multiplicative Structures.
  - c. The Evolution of Preservice Secondary Mathematics Teachers Beliefs (pp. 224-230)
4. Models for Learning Mathematics -ERIC/SMEAC - Papers from a Research Workshop
    - a. A Dynamical Model for Cognitive Development with Applications to Problem Solving (pp. 121-142, July, 1976)
  5. Constructivist Perspectives on Science and Mathematics Learning (pp. 9 - 21)
  6. Assessing Higher Order Thinking in Mathematics
  7. Research Ideas in the Learning and Teaching of Algebra

**Reading Assignments by Date:**

NMT: *The Nature of Mathematical Thinking*

TML: *Theories of Mathematical Learning,*

<b>Date:</b>	<b>Main Assignment:</b>	<b>Date:</b>	<b>Main Assignment:</b>
Jan. 13	CSME: Overview, Ch.1	Mar. 10	TML: Chapters 14
Jan. 15	NMT: Chapter 1	Mar. 12	TML: Chapter 15
Jan. 20	NMT: Chapter 2	Mar. 24	TML: Chapter 16
Jan. 22	NMT: Chapter 3	Mar. 26	TML: Chapters 17 & 18
Jan. 27	NMT: Chapter 4	Mar. 31	TML: Chapter 19
Jan. 29	NMT: Chapter 5	Apr. 2	TML: Chapter 20
Feb. 3	NMT: Chapter 6	Apr. 7	TML: Chapter 21
Feb. 5	NMT: Chapter 7	Apr. 9	TML: Chapter 22
Feb. 10	NMT: Chapter 8	Apr. 14	TML: Chapter 23
Feb. 12	NMT: Chapter 9	Apr. 16	TML: Chapter 24
Feb. 17	NMT: Chapter 10	Apr. 21	TML: Chapter 25
Feb. 19	NMT: Chapter 11	Apr. 23	TML: Chapter 26
Feb. 24	To be Announced	Apr. 28	TML: Chapter 27
Feb. 26	TML: Chapter 11	Apr. 30	Case Presentations
Mar. 3	TML: Chapter 12	May ?	Case Presentations
Mar. 5	TML: Chapter 13		

In addition to the readings from the two required texts (above), you will be required to read and report from the secondary texts and others professional materials such as the *Journal of Research in Mathematics Education* (JRME) and writing of Psychology in Mathematics Education(PME). Copies of these materials will be handed out to you in class as we address them.