MAE 302/520: METHODS AND MATERIALS FOR TEACHING SECONDARY SCHOOL MATHEMATICS

SPRING 2007, THURSDAY 2:20- 5:00
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PURPOSE: This course will focus on the implications of our knowledge about mathematical learning and teaching for creating effective math classroom environments. Our inquiry will focus on students' understanding of mathematics, the ways students learn mathematics, and on what that implies for the optimal design of lessons, unit planning, the adaptation of curriculum materials, assessment, and issues of differentiation and diversity. We will approach these topics through reading, observation, planning, demonstration and analysis, and through informed collaborative reflection in a community of inquiry.

This course is intended to support your learning and professional growth. Its goals are: to further increase your theoretical knowledge and practical experience in planning, teaching and assessing students; to increase your understanding of the mathematical needs of a diverse range of students; to examine your own beliefs and assumptions about mathematics and how it should best be taught; and to understand the complexities of diverse, multi-ability classrooms while broadening your repertoire of teaching strategies.

REQUIRED TEXTS:

*Reading List. D*esignated readings will be distributed by the instructor a week prior to the specific session.

Wiggins, G., & McTighe, J. (2005). *Understanding by design* (2nd edition). VA: ASCD.

Dodge, J. (2005). *Differentiation in action*. NY: Scholastic Teaching Resources.

Boaler, J., & Humphreys, C. (2005). *Connecting mathematical ideas*. Portsmouth, NH: Heinemann.

NCTM. (2000). *Principles and standards for school mathematics*. Reston, VA: NCTM.

REQUIREMENTS:

1. ATTEND CLASS AND PARTICIPATE. This course is designed to be interactive and collaborative, and requires each member's presence and participation for complete success. More than one absence constitutes grounds for grade reduction.

2. COMPLETE READINGS prior to the session for which they are assigned. Bring them to class, as we will be using the texts and referring to them regularly.

3. MAINTAIN A READING JOURNAL, in which you react specifically to the readings, and--if relevant to the readings—to the concepts and themes that emerge in class. One typewritten page (double-spaced) minimum is expected for each journal entry. The journals will be collected by the instructor twice before the final submission— at the end of February, and on March 22.

4. COMPLETE ASSIGNMENTS: There will be several individual and group assignments.

A. STUDENT ASSESSMENT ASSIGNMENT (individual) – Using three different assessment tools, including an interview and standard test, you will assess one student's understanding of a single topic area. Due April 12.

B.1. UNIT PLAN DEVELOPMENT PART I (individual). For this assignment, you will need to submit your choice of mathematical topic; a rationale for the topic, including why it is mathematically important to teach to students; your approach to the topic, including an analysis of how the topic fits into the year-long curriculum; a general outline of your unit and the material you will cover; and an overview of your assessment goals and assessment plan. Your topic should be chosen from one of the two content areas that dominate middle and high school mathematics: algebra and geometry. Due March 29

B.2. UNIT DEVELOPMENT PART II (individual). Unpack your unit plan and present it in detail, including a calendar for the unit which lists both the content you have planned for each day as well as the kinds of activities and/or discussions you will conduct. The calendar should demonstrate a range of different classroom activities and small-group/whole-group discussions, as well as an understanding of how to sequence and scaffold instruction. Your

calendar must include the topic and learning goals for each day, possible activities or teaching strategies for the day, and all assignments. Develop in detail two lesson plans that are part of this unit. Finally, include a personal reflection on this particular experience of unit development. Due Final Exam.

C. LESSON DEMONSTRATION (individual)**—**You are expected to teach a 30-40 minute lesson of your choice to our class that is part of the unit you have developed. Write a reflection based on the group commentary and your own judgment of the effectiveness of the lesson, include suggestions for improvement, and include it in the unit plan. Due: TBD.

D. ANALYSIS OF A MATHEMATICAL TASK (group) You are required to examine one or more mathematical tasks observed in the course of your field experience, and to consider what potential the task(s) provide for student learning.

5. SELF-EVALUATION: Hand in an in-depth self- and course-evaluation at the end of the semester, 2 typewritten pages minimum, organized according to the criteria enumerated below. The self-evaluation should be comprehensive, honest, not afraid of self-criticism, include a description of how one's understanding might have changed as a result of the course, and of how one's future goals might have been modified by the course experience.

6. COMPILE AND SUBMIT a final packet on the last day of class, including #'s 3, 4, and 5 above.

All written work should be typewritten, double-spaced (1" margins, 12 font), and saved on disk.

EVALUATION:

Your final evaluation will be based on the completed readings and reading journal, assignments, and class participation, **which includes attendance,** based on the criteria for each which follows. Some of the reasons for modifying your final grade downward might be: more than one absence; leaving class early without explanation; final packet of work is not complete; submitted work which instructor doesn't consider to meet the minimum criteria of the course and/or the Teacher Preparation Program; no detailed, in-depth self-evaluation at the end of course.

READING JOURNAL:
Weekly entry
Direct, detailed references to readings and classroom discussions.

The primacy of the text as interlocutor
Clarity and entailment of arguments
Level of engagement with material and with class themes

ASSIGNMENTS

UNIT DESIGN AND FACILITATION OF LESSON:
Clarity and structure of design
Clear focus on stated purposes and objectives
Appropriateness of the designed exercises
The level of conceptual problematization of the designed exercises and discussions
Incorporation of ideas and information from class texts and discussions
Quality of facilitation

CLASS PARTICIPATION:
Participation as evidenced by regular attendance
Design and facilitation of classroom activities with the group
Verbal and/or attentional participation
Use of critical thinking skills and dispositions in discussions, e.g. active listening, raising questions, seeking clarification, summarizing, offering counterarguments, questioning assumptions, offering hypotheses, etc.
Evidence of developing community-building skills
Ability to work in groups
Active participation in group tasks
Self-evaluation

Final grade:
Classroom participation and reading journal -30%
Unit Development- 40%
Lesson demonstration-10%
Analysis of a mathematical task 10%
Student assessment assignment 10%

Note: This syllabus is subject to change during the semester.