TE 857: Teaching and Learning Mathematical Problem Solving
Course information, Spring, 2004

General information:

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Office hours: By appointment
Course meeting time: Saturdays, 9 am to 4 pm
Course meeting location: Seaholm High School, Birmingham, MI

Course meeting information:

TE 857 will meet on Saturdays in January and February, from 9 am to 4 pm, in room E105 in Seaholm High School, 2436 West Lincoln Street, in Birmingham, Michigan. More specifically, the course will meet on 7 of the following 8 Saturdays: January 10, January 17, January 24, January 31, February 7, February 14, February 21, and February 28. (At the first class meeting, students and instructor will decide which on these 8 Saturdays the class will not meet, taking school vacations into account.)

Course description:

Students in TE 857 will explore the teaching and learning of mathematical problem solving. Of particular interest are problem-solving, problem-posing, the role of problem-solving in the K-12 mathematics curriculum, the teaching of problem-solving strategies, the facilitation of student problem-solving, and the representation of problem-solving in various mathematics curricula.

Please note that TE 857 is a masters level course, meaning that expectations of students are significantly higher than in undergraduate-level courses, both for in-class and out-of-class work. Out of class, students will be expected to complete a number of readings, both from the research and the practice literatures, and to write both short and long papers. In class, students will be asked both to participate and to help facilitate discussions and activities.

Course format and other details:

The general format of TE 857 will be flexible, with a combination of small and large group discussions, group collaborative activities, lectures, mathematical problem-solving, and classroom video observations. High levels of student participation and activity are expected. Most of the course activities are designed to get students to actively engage with the course material. Students will be reading, writing, presenting, debating, and questioning. In this course, students will not be able to sit passively and receive the course content; course activities are designed to get everyone to think deeply. More specifically, for each week of the class, you will be expected to (a) complete the assigned readings; (b) complete a very short (one page, usually) writing/reflection assignment, when assigned; and (c) complete a mathematics problem-solving activity, when assigned. (See below for a
description of each of these three types of regular assignments.) There will be two longer course papers as well, described below.

The timing of the course, Saturdays 9 am to 4 pm, presents both challenges and opportunities for TE 857. It is assumed that many, if not most, of TE 857 students are employed full-time, most likely as K-12 teachers. Taking a masters course while working (and also considering other family obligations that students may have) will involve significant juggling, and completing the course assignments on time and attending all classes will be challenging. However, there are only seven classes, so it is extremely important that students make a concerted effort to complete all assignments and to attend all classes, in order to get the most out of the course.

We will take breaks during class when needed; the timing of our breaks will vary depending on what we are working on and talking about at the time. In addition, we will take a lunch break from 12 noon to 1 pm each Saturday. Students are welcome to bring their own lunch and eat, relax, work, and/or socialize during the lunch break. Alternatively, students (individually or in groups) can leave class and get lunch off-campus; however, please note that class will resume promptly at 1 pm.

It is expected that all students have a working e-mail address that is checked regularly (e.g., at least once each day). E-mail will be the our primary means of communication. It is particularly important that students check e-mail on Fridays, in case there are any last minute announcements that are important for each Saturday’s class. For last minute weather-related travel issues (e.g., a Saturday morning blizzard or major traffic snafu), please contact Dr. Star on his cell phone – see above for the number.

**Course readings:**

There is no required textbook for this course. A partial list of required course readings will be distributed during the first class. Students should plan on being assigned at least two articles or chapters to read prior to each class.

**Reflection assignments:**

You will have a written “Reflection Assignment” due for most Saturdays. Reflection Assignments will involve writing about a page about a topic that will be assigned to you. Sometimes you will be writing a reaction to something that you’ve read or that we’ve talked about in a prior class; at other times, you will be asked to give an opinion on a topic that we will be talking about in a future class. As the name suggests, Reflection Assignments are intended as a vehicle for reflection about what you are reading, thinking about, and learning. More specifically, the purposes of these assignments are: to allow students to synthesize and summarize the material from the weekly readings; to encourage students to apply and interpret the theoretical material from the readings to the lives and issues of teachers and teaching; and to assess whether students have completed the readings for each week.

Reflection Assignment topics will be announced on the Saturday one week prior to when they are due. Reflection Assignments will be graded on how well you can incorporate, comment on, and utilize the content (class readings and discussions) that the assignment draws upon. In addition, these assignments will be assessed on promptness, spelling, length, and grammar. Do not attempt a Reflection Assignment until you have completed the readings for a particular week. Each assignment is designed to make use what you are reading, and it is extremely unlikely that you would be able to write an acceptable reflection without first doing the readings. **No late papers will be accepted** after
the beginning of the class on the due date of a Reflection Assignment. Assignments can be submitted via e-mail attachment or on paper. More specifically: Reflection Assignments should be word-processed, single-spaced, 12-point Times or Times New Roman font, 1” margins all around, and about a page (at least 500 words).

Math problem solving:

To aid in our discussions about mathematical problem-solving, students will frequently engage in problem-solving themselves, both in and out of class. For many Saturdays, students will be given a math problem to complete as homework. The problem will be announced on the Saturday one week prior to when it is due. A written write-up of the problem and its solution will be due at the beginning of each Saturday’s class. Math problem solutions will not be graded for solution accuracy. Rather, students are expected to give careful thought to the problem and neatly and clearly represent their thinking and strategies in writing.

Course papers:

In addition to the Reflection Assignments, students are required to complete two additional papers in TE 857 – a Research Synthesis and a Teaching Episode Analysis.

The goal of the Research Synthesis paper is for students to dive more deeply into empirical research on a math education topic of interest. Students should identify a topic, select and carefully read four empirical research articles that explore this topic, and then write a paper that compares and contrasts the findings from the four articles. The paper should be word-processed, single-spaced with Times or Times New Roman font, with 1” margins all around, and four full pages long. Students should select a topic for approval by January 24; articles should be selected and approved by February 21. See below for information about the final due date of this paper. Additional details about this paper will be discussed in class.

The goal of the Teaching Episode Analysis paper is for students to critically examine a problem-solving teaching episode. The episode should be no longer than one class period in length and should be from a K-12 mathematics classroom. Students are expected to examine the teaching episode using the readings and discussions about problem-solving that will occur throughout the course. The paper should be word-processed, single-spaced with Times or Times New Roman font, with 1” margins all around, and four full pages long. See below for information about the final due date of this paper. Additional details about this paper will be discussed in class.

Both papers may be turned in (via e-mail attachment or US mail) at any time; students may complete the papers in either order. However, by midnight on Saturday, March 27, one paper must be submitted. And by midnight on Saturday, April 24, the other paper must be submitted.

Class participation:

Class discussions will be most fruitful if all students are prepared for class and actively participate. Accordingly, students will be given a participation grade, as follows. Class participation will be graded each class on the standard 4-point MSU grading scale, where 0 = absence from class, 1.5 = unacceptable participation, 3.0 = acceptable participation, and 4.0 = quality participation, all as defined below.
Quality participation is characterized by:
- active, enthusiastic participation and active listening in class discussions and activities
- demonstrating your understanding of class readings by using what you’ve read to help explain or justify comments
- asking thoughtful questions
- responding to other students’ comments in a responsible and constructive manner
- leadership and active participation in small group activities, helping keep the group on task
- relating concepts from class to your experiences as a teacher and as a learner

Acceptable participation is characterized by:
- reasonable participation and reasonably active listening in discussion and activities
- demonstrating some knowledge of class readings in comments
- asking clarification questions about readings and concepts

Unacceptable participation is characterized by:
- physical presence in class but cognitive absence (e.g., reading a newspaper)
- non-constructive responses to the comments of other students
- no real attempt to complete tasks in a reasonable or thoughtful way
- no participation in group activities or actual attempts to distract others
- tardiness to class

Grading:

- Class participation 20%
- Math problem-solving exercises 10%
- Reflection Assignments 20%
- Research Synthesis paper 25%
- Teaching Episode Analysis paper 25%

On missing class

Because each Saturday is 1/7 of the entire course, missing any class is to be avoided, if possible. If missing a class is unavoidable, please let Dr. Star know about the situation well in advance. Students are still responsible for completing all work due for any missed class. Students who miss two or more classes during the term will receive a 0.0 participation grade for the entire term.

Meeting with Dr. Star outside of class

I would very much enjoy meeting with each of you outside of class, either when problems or questions arise or just to chat. Because of your work schedules, I realize that this may be logistically challenging but hopefully not impossible. Because of family obligations and transportation time, it may not be possible for me to come to class early or stay late on Saturdays. But it may be possible for us to have a phone meeting, an e-mail conversation, or even meet in person in the evening or at your school or place of work.
An official word about academic honesty

Students are strongly encouraged to discuss the course material, papers, writing assignments, and projects with their peers, both in and out of class. However, it is expected that all submitted work, including oral presentations, will be completed by students individually and will be the result of each students’ own individual thoughts and ideas, unless otherwise indicated (by citation, other than course readings). Students are encouraged to refer to MSU’s General Student Regulations (excepts below) or to see me with any questions or concerns about plagiarism or improper working together.

“The principles of truth and honesty are fundamental to the educational process and the academic integrity of the University; therefore, no student shall: (1.01) claim or submit the academic work of another as one’s own. (1.02) procure, provide, accept or use any materials containing questions or answers to any examination or assignment without proper authorization. (1.03) complete or attempt to complete any assignment or examination for another individual without proper authorization. (1.04) allow any examination or assignment to be completed for oneself, in part or in total, by another without proper authorization. (1.05) alter, tamper with, appropriate, destroy or otherwise interfere with the research, resources, or other academic work of another person. (1.06) fabricate or falsify data or results.” (From MSU’s General Student Regulations, Protection of Scholarship and Grades)

Please note that academic dishonesty, including plagiarism, may result in a zero grade in the course and removal from the program.

Keys to being successful in this course

• Come to class, and arrive on time!
• Do the readings and all assignments!
• Engage with the course material!
• Participate in class!
• Submit all assignments on time!
• Talk to Dr. Star outside of class if you have questions, comments, or concerns.
Reading list

Saturday, January 10: First class – introduction to problem-solving
(no readings)

Saturday, January 17: Problem-solving standards, strategies, and tasks

Saturday, January 24: Metacognition and mathematical problem-solving

Saturday, January 31: Teaching problem-solving
Saturday, February 7: Technology and mathematical problem-solving


Saturday, February 14: (no class)

Saturday, February 21: Problem solving in the mathematics curriculum


Saturday, February 28: Last class