

ED 402-002-Winter 2007

Using Literacy to Teach and Learn Mathematics in the Secondary Schools

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COURSE PURPOSE AND OBJECTIVES

Have you ever thought about all of the reading that you do as a math major at the university? Is reading for your mathematics courses the same as the reading that you do for science courses you've taken? The history courses? Your English literature courses? If yes, what makes the processes the same? If not, then how are the processes different? Do you read numbers, words, symbols? What kind of writing do you do? And where and when did you learn to read the way you read and write in your mathematics courses? How much does your reading intersect with your doing of mathematics? Has the reading always seemed easy to you? Has it always been easy to write the way your professors expected you to write? What, indeed, do you know about the reading and writing processes, regardless of content?

These are not just idle questions: The purpose of this course is to teach you about reading and writing within the disciplines and to examine both the possibilities and challenges for students as they use and produce texts in the disciplines of middle and high schools. Of course, the purpose doesn't end there. We also want to acquaint you with information about reading and writing *processes*—especially those that are important for reading in the mathematics—and with pedagogical approaches that help students use texts to learn and become critical readers of mathematics, both in school and in the everyday world.

Please think of this course as a course on using reading, writing, and other communication tools in your content area. Influential teachers—those who hope to make a difference in young people's lives—acknowledge that all subject areas include some form of communication, and that literacy—or reading and writing of written texts—is one important communicative form in any content area. Influential teachers also recognize that these various forms of communication, including literacy, influence their students' current and future academic, work, social, and political lives. Part of being an influential teacher, then, is a commitment to helping students use and improve on multiple communication abilities.

To these ends, we will examine theoretically grounded and empirically supported instructional methods that: (a) assess and prepare students for reading, writing, discussion, interpretation, and critique; (b) help students become strategic readers and writers of content-area concepts; (c) help students comprehend new material and concepts; (d) encourage students to write to learn; (e) draw on and extend in- and out-of-school literacy practices; (f) allow teachers to analyze, critique, and use textbooks and other print materials to meet their students' diverse interests and

needs; and (g) assess students' literacy growth and their needs for additional development, and use assessments to plan next instructional moves.

At the end of this course, you should be able to do the following:

1. Clearly state and critically assess your own beliefs about literacy and learning in your content area.
2. Explain the nature of and relationship among literacy processes and practices such as reading, writing, discussing, interpreting, and critiquing and explain how these processes and practices relate to thinking and learning in your discipline.
3. Explain how the following concepts relate to the growth of critical literacy skills, strategies, and practices among adolescent students in your content area:
 - a. text structure, organization, and considerateness;
 - b. comprehension and interpretation of text;
 - c. strategic literacy abilities and metacognition;
 - d. pedagogical frameworks;
 - e. technical vocabulary and concepts;
 - f. social interaction and discussion;
 - g. students' and teachers' beliefs about and experiences with reading, writing, discussion, interpretation, and critique;
 - h. the intersection of academic and social or cultural literacy practices;
 - i. the cultural, historical, political, and social context of secondary schools and society.
4. Analyze different kinds of texts you might use in your content area by addressing the challenges they will present to students across a variety of dimensions.
5. Demonstrate an understanding of how good teachers plan by describing how you will consider the contexts in which you will teach, the readers and writers you will be teaching, and the texts you'll be expecting students to read, write, and speak.
6. Plan lessons that integrate mathematics literacy instruction into the overall mathematics curriculum.
7. Teach and assess your own mathematics lesson.
8. Assess student products for the purposes of evaluating students' growth, determining areas in which students need to continue developing, and planning next steps in your own instruction.

COURSE THEMES

Over the course of the semester, we will examine four themes related to the idea that literacy is a part of all teaching and learning:

- *What is literacy? What is literacy in mathematics and mathematics classes?*

This tends to be more theoretical and we will do a lot of work around what it means to read and write as a mathematician and as an everyday person reading math-related texts, etc. First, how many of you have thought about and seriously studied what goes on in the mind as one reads? Have you thought about how social and cultural trends and practices shape the ways people read and write? We'll spend some time learning what the past 100 years of reading and writing research have taught us about general reading processes. Then we'll turn to the question of what it means to read or write in a discipline. How many of you have ever thought about what it means to read like a mathematician? We'll read articles by our very own Dr. Hyman Bass (mathematician in LSA and mathematics educator in the School of Education) and by your mathematics methods professor next year, Dr. Pat Herbst. We will also read texts by mathematics and mathematics education scholars to explore this question. In addition, we'll discuss how the different texts you might use to teach mathematics could present unique challenges to your middle and high school students.

- *How do literacy practices in mathematics classrooms reflect and reproduce social, cultural, and structural arrangements outside of school?*

This theme relates to ED 392, as we examine how literate practices are tied to culture, race, class, gender, etc. and how schools privilege certain kinds of literate practices. In particular, we'll look at how language use and literacy learning in mathematics reflects and reproduces certain ways of using language and literacy in society. We will also read an article that discusses how the social and economic structures of schools shapes access to textual resources, and then learn how to examine texts, adapt them for classroom purposes, and develop strategies to help students make sense of texts.

- *Who are your students? Who are you as mathematics and literacy teachers? How does one plan instruction that draws from and extends students' prior knowledge and experiences?*

Here we want to carefully examine our own beliefs about teaching, learning, our disciplines, and the kids we might teach. We will use the school and student studies that you will complete (see details in a latter section of the syllabus) to ground these discussions in actual people's lives and experiences. It would be great if you could all be moving into data collection for your student studies by this point, even if you haven't completed your student study by this time. Our goal here will be not only to learn about who students are, but to think about how to draw from the knowledge, interests, and experiences they bring to the classroom to engage learners and to set purposes for mathematics learning, reading, and writing.

- *What are some ways to teach students to read and write content (mathematics) more effectively?*

This is all about literacy teaching routines and strategies that you can use in your mathematics classrooms. We'll explore three approaches to instruction (cognitive, sociocultural, and critical), as well as two instructional frameworks (Before-During-After; Integrated Reading and Writing Instruction), and multiple routines and strategies for guiding students' reading and writing of texts. These routines and practices help teachers elicit and draw from what adolescents already know and care about as ways to engage their students in learning

mathematics concepts; set purposes for reading, writing, and learning in the mathematics; and focus on studying concepts, rather than discrete facts. All of these routines and strategies are designed to be integrated into mathematics lessons so that they not only support students who may struggle with reading and writing but also teach young people how to read and write as members of the disciplines do. You'll learn how to plan lessons and you'll get a chance to plan three and teach some or all of one in your field classroom.

COURSE REQUIREMENTS

The following is a list of course requirements. Detailed guidelines and evaluation rubrics are available on CTools.

PARTICIPATION: Our class will build on readings, discussions, in-class demonstrations and deconstruction of strategies, your knowledge of schools, and your personal and collaborative reflections. As a result, your participation in our class activities is important not only for your own learning, but also for the learning of others in the class. You should treat our class as part of your professional experience by taking responsibility for assignments and discussion and by acting in a professional and collegial manner. You will receive 2 points for your professional and collegial participation in each class meeting and in field-based activities. If you must miss a class, you need to contact me (or leave a message on my voice mail) **PRIOR** to the class. Merely attending class, however, doesn't really promote deep learning. Thus, I will also evaluate your participation in class. Participation can take many forms. I will evaluate you holistically across these categories to determine whether you have earned the five points for each session:

- Regular attendance
- Thoughtful, prepared, and courteous participation in whole- and small-group activities (including evidence of having completed readings)
- At least one 20-minute meeting with either Dr. Moje or Ms. Kim before the end of the term.
- Collaborative work with your field partner and other small groups in the class.

READINGS: Read all assigned readings and participate in discussions or activities for which the readings serve as a springboard.

SCHOOL/TEXT/STUDENT STUDY: Prepare a school study, a text/materials study, and a student study all related to the Practicum 1 placement site.

- The guiding questions you will be asked to address mirror those on the assessment that you're taking at the beginning and the end of the term. These questions (and rubrics to guide your preparation of your reports) can be found on our CTools site, under the labels **SCHOOL STUDY, TEXT STUDY, and STUDENT STUDY.**

- We have scheduled your reports of these studies to be due throughout the semester so that we can discuss them in class and in Practicum I, so you need to begin working on the first part (SCHOOL STUDY) immediately!
- You also need to collect student permission forms (available on CTools site) as quickly as you can. That means that you need to start talking with your CT and with your students so that you can ask them to let you "study" them. When you ask them, you need to clarify that you will not be doing a research study. You are studying them as a way of helping you learn how to be a teacher. **BEGIN WORKING ON THIS IMMEDIATELY!**
- For the STUDENT STUDY, you will construct and administer several instruments, and this takes some planning. You need to allow for time to administer certain instruments that you must construct. You can start developing your instruments well before you administer them. That will save you some time down the road.

PLANNING FOR INSTRUCTION/TEACHING EXPERIENCE ANALYSIS: You will plan 3 mathematics LITERACY lessons. We will plan one as a group, one in small groups, and one individually. These should be lessons that you would normally teach in mathematics. The *literacy* piece is not meant to be an additional activity. Instead, you will demonstrate in your planning that you have:

- analyzed the texts that you would want your students to read or write
- developed a lesson that will not only use these texts, but also teach them *how* to read and write in the ways you expect
- included a method for assessing whether students have successfully read and/or written the texts you've included/assigned.

You will teach at least one time in your practicum field classroom. Your teaching can take many forms (a one-on-one session with a student, a small group, a whole class, field trips, lectures, showing and discussing a film, carrying out a simulation, etc.) You will work with Ms. Jeppsen and your CT to decide when, what, how, and whom you will teach. You will also work with your Practicum partner to coordinate the teaching so that you can help each other.

If you choose only to teach one time, then that teaching experience must be based on your individually planned literacy lessons. You may, however, teach more than one time, and you can document any of your teaching experiences, as long as the teaching involves **SOME ASPECT OF LITERACY INSTRUCTION in the mathematics.**

In addition to the actual teaching, we require you to document your teaching in some form. You should document your teaching with a videotape, accompanied by a written analysis of your experience. You may use your own equipment, or you may use video equipment from the SOE tech services, but *you* need to reserve this equipment *ahead of time*. You will need to:

- provide your own videotape
- make sure the equipment is charged and ready to go

NB: An important aspect of getting these field-based assignments done is **SCHEDULING**. You need to read through your syllabus *ahead of time*, and make a plan for getting your field-based assignments done, keeping in mind your school site's schedule, as well as your own. We will not accept late assignments, just as you will not be able to teach your lesson late or turn in grades late when you are a teacher. Professionalism is about thinking and working ahead and about living up to obligations.

FINAL EXAM: The post-assessment serves as your final examination for the course. Our final exam meeting is scheduled for **Monday, April 23, 6:00-9:00 PM**. All students must be present for the final exam. We will not make exceptions for the examination.

COURSE MATERIALS REQUIRED

- Moje, E. B. (2000). *All the stories that we have: Adolescents' insights about literacy and learning in secondary schools*. Newark, DE: International Reading Association. (at www.amazon.com, www.reading.org, or University bookstores)
- Borasi, R., & Siegel, M. (2000). *Reading counts: Expanding the role of reading in mathematics classrooms*. New York: Teachers College Press.
- Readings on CTools

EVALUATION

Grades will be assigned on the basis of both process and product. Revisions of work will be accepted for ONE WEEK after the work is returned to you, but late work will NOT be accepted. WE ALSO WILL NOT ACCEPT WORK FROM YOU IF YOU ARE NOT IN CLASS ON THE DAY THAT IT IS DUE. We will calculate your grade as follows:

Class participation	30 points
School Study (Partner)	30 points
Text Study (Partner)	50 points
Student Study (Individual and Partner)	50 points
Lesson 1 (Whole Group)	10 points
Lesson 2 (Small Group)	40 points
Lesson 3 (Individual)	50 points
Practicum Teaching Reflection	30 points
<u>Final Exam</u>	<u>50 points</u>

TOTAL

340 POINTS

The grading scale is:

100-95	A	76-73	C
94-90	A-	72-70	C-
89-87	B+	69-67	D+
86-83	B	66-63	D
82-80	B-	62-60	D-
79-77	C+		

NB: This is a professional course as well as an academic course. As part of course participation you should be giving evidence that you are learning and applying professional standards generally expected of educators in matters of timeliness, personal presentation, and general conduct. (These standards may be different from the norms of university student culture in general. Professionals are judged by results as well as by effort or good intentions.)

TENTATIVE COURSE SCHEDULE, ED 402-002, WINTER 2007

DATE	THEME	ASSIGNMENTS
1-8	<p>What is literacy? What is literacy teaching in the mathematics? How does one plan for teaching literacy in the mathematics?</p> <p><u>Activities:</u></p> <ul style="list-style-type: none"> • Planning for Instruction Activity • Multiple forms of representation—Eisner reading • SOE Secondary Teacher Education Assessment (Pre) 	
1-15	NO CLASS—Martin Luther King, Jr. Day Holiday	

1-22	<p>What are some views of literacy in mathematics?</p> <p><u>Activities:</u></p> <ul style="list-style-type: none"> • Discussion of readings • Mini-lesson on literacy processes and practices • Discussion of school study 	<p><u>READ:</u></p> <ul style="list-style-type: none"> • Alberta Math Literacy article • BallStacey article • Bass article • Borasi & Siegel book, Ch. 1-2 • deLange article • Romberg article • School Study Guidelines <p>DUE:</p> <ul style="list-style-type: none"> • Reading Guide
1-29	<p>What is involved in the reading process? Why are people so concerned about adolescent literacy? What is the role of text in mathematical literacy?</p> <p><u>Activities:</u></p> <ul style="list-style-type: none"> • Discussion of readings and Literacy CD map • Analyzing Texts: Lecture and activity • Questions about school study 	<p><u>READ:</u></p> <ul style="list-style-type: none"> • Borasi & Siegel book, Ch. 3-4 • Carnegie/Alliance READING NEXT report • Moje book, Chs. 1, 2 • Moore, Bean, Birdyshaw, & Rycik; • Text Study Guidelines <p>DUE:</p> <ul style="list-style-type: none"> • Literacy CD map
2-5	<p>What are secondary schools and classrooms like? How do schools and classrooms both reflect and shape social, cultural, and community arrangements?</p> <p><u>Activities:</u></p> <ul style="list-style-type: none"> • Questions about Text Study Discussion of readings and school studies • Mini-lesson on relationship between school, society, and literate development/skill 	<p><u>READ:</u></p> <ul style="list-style-type: none"> • Anyon** • Martin • Civil & Bernier • Gutstein <p>DUE:</p> <ul style="list-style-type: none"> • SCHOOL STUDY <p>**ASSIGNED FOR ED 392 AS WELL</p>

2-12	<p>What are students' knowledge, perspectives on, and experiences with Literacy and Learning</p> <p>ASSESSMENT FOR MATHEMATICS TEACHING</p> <p><u>Activities:</u></p> <ul style="list-style-type: none"> • Discussion of readings • Development of interview and observation protocols • How to construct and conduct Content Reading Inventory (CRI) • Assessment for teaching mathematics literacy 	<p><u>READ:</u></p> <ul style="list-style-type: none"> • Moje, 2000 • Moje book, Ch. 3-6 • Nicholson • Content Reading Inventory instructions • Literacy Motivation Questionnaire <p><u>DUE:</u></p> <ul style="list-style-type: none"> • TEXT STUDY • Draft of in-depth interview questions for student study
2-19	<p>What are some ways to teach and use literacy?</p> <p>PLANNING FOR MATHEMATICS INSTRUCTION</p> <p><u>Activities:</u></p> <ul style="list-style-type: none"> • Assessment for teaching mathematics literacy • Group lesson planning 	<p><u>READ:</u></p> <ul style="list-style-type: none"> • Borasi & Siegel book, Ch. 5 • www.RethinkingSchools.org article on Bob Moses's Radical Equations <p><u>DUE:</u></p> <ul style="list-style-type: none"> • Read Whole-Group lesson materials and analyze the texts • Write student learning objectives for the materials • Choose 1 strategy from readings that might work for the group plan and be ready to present it and explain why you think it would be useful
2-26	NO CLASS—WINTER BREAK	

3-5	<p>What are some ways to teach and use literacy?</p> <p>INTRODUCTION TO INSTRUCTIONAL/PEDAGOGICAL FRAMEWORKS AND STRATEGIES</p> <p><u>Activities:</u></p> <ul style="list-style-type: none"> • Mini-lesson on pedagogy • Begin small-group lesson planning • Small-group discussion of Buehl strategies 	<p><u>READ:</u></p> <ul style="list-style-type: none"> • Moje book, Ch. 7; • www.algebraproject.org links to Algebra project curriculum materials • Small-Group Lesson Materials • Skim strategies from readings and have some in mind for application to the small-group lesson materials <p><u>DUE:</u></p> <ul style="list-style-type: none"> • Be prepared to discuss instructional/ pedagogical frameworks (e.g., cognitive, sociocultural, and critical) • WHOLE-GROUP LESSON PLAN (COMPLETED IN CLASS LAST WEEK)
3-12	<p>What are some ways to teach and use literacy?</p> <p>COGNITIVE/SOCIOCOGNITIVE PEDAGOGY</p> <p><u>Activities:</u></p> <ul style="list-style-type: none"> • Mini-lesson on cognitive/sociocognitive pedagogy • Modeling of strategies • Small and whole-group discussion of small-group lesson plans 	<p><u>READ:</u></p> <ul style="list-style-type: none"> • Borasi & Siegel, Ch. 6 • Deshler et al. article • Fischer • Tanner & Casados article <p><u>DUE:</u></p> <ul style="list-style-type: none"> • NOTHING! • BUT DON'T FORGET TO WORK ON SMALL-GROUP LESSON PLANS!
3-19	<p>What are some ways to teach and use literacy?</p> <p>COGNITIVE/SOCIOCOGNITIVE PEDAGOGY</p> <p><u>Activities:</u></p> <ul style="list-style-type: none"> • Small-group informal presentations of lesson plans • Questions on student studies 	<p><u>READ:</u></p> <ul style="list-style-type: none"> • Borasi & Siegel, Ch. 7 • Draper article <p><u>DUE:</u></p> <ul style="list-style-type: none"> • SMALL-GROUP LESSON PLAN 2

3-26	<p>What are some ways to teach and use literacy? SOCIOCOGNITIVE/SOCIOCULTURAL PEDAGOGY</p> <p><u>Activities:</u></p> <ul style="list-style-type: none"> • Mini-lesson on sociocultural pedagogy • Modeling of teaching practices • Work on individual lesson plans, as time allows 	<p><u>READ:</u></p> <ul style="list-style-type: none"> • Donahue article • Moje book, Ch. 8 • Moje & Hinchman • Schofield & Rogers <p>DUE:</p> <ul style="list-style-type: none"> • NOTHING!!
4-2	<p>What are some ways to teach and use literacy? SOCIOCOGNITIVE/SOCIOCULTURAL PEDAGOGY</p> <p><u>Activities:</u></p> <ul style="list-style-type: none"> • Modeling of teaching practices • Small-group discussion of individual lesson plans 	<p><u>READ:</u></p> <ul style="list-style-type: none"> • Pugalee <p>DUE:</p> <ul style="list-style-type: none"> • LESSON 3
4-9	<p>What are some ways to teach and use literacy? Sociocultural/Critical literacy pedagogy</p> <p><u>Activities:</u></p> <ul style="list-style-type: none"> • Discussion of readings • Mini-lesson on sociocultural and critical literacy pedagogy • Modeling of critical literacy teaching practices • Small-group discussion of student studies 	<p><u>READ:</u></p> <ul style="list-style-type: none"> • Moses & Cobb excerpts • Heller <p>DUE:</p> <ul style="list-style-type: none"> • STUDENT STUDY
4-16	<p>What are some ways to teach and use literacy? Critical literacy pedagogy</p> <p><u>Activities:</u></p> <ul style="list-style-type: none"> • Discussion of readings • Mini-lesson on critical literacy pedagogy • Small-group discussion of practicum teaching experience 	<p><u>READ:</u></p> <ul style="list-style-type: none"> • Moses & Cobb excerpts <p>DUE:</p> <ul style="list-style-type: none"> • TEACHING ANALYSIS
4-23	<p><u>FINAL EXAM MEETING</u> WILL MEET IN COMPUTER LAB; EXACT LOCATION TO BE DETERMINED</p>	<p>TAKE POST-ASSESSMENT DURING EXAM TIME</p>