

EMAT 3400: Children's Mathematical Learning
Fall 2005, MW, 8:00-9:55 am, rm 102

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Overview

This course is the first of two mathematics education classes you will take in the Early Childhood Program. In this course, you will have classes at UGA and a field experience at Barrow Elementary School—you will meet with one elementary school student for out-of-class activities. During our class meetings at UGA and our activities at Barrow we will focus our work on *learning how children learn mathematics*. Although we will talk about classroom ideas and teaching practices, *this course concentrates on children's mathematics*.

Throughout this course, you are expected to combine our discussions in class and the experience at Barrow to rethink your own knowledge of mathematics, as well as the learning and teaching of mathematics during the first years of schooling. In particular, you should make an effort to *look through the eyes of children, trying to understand how they generate mathematical ideas*.

We will discuss questions such as: How do we learn mathematics? How do children solve problems in mathematics? How do children construct mathematical concepts? We will address these questions mostly in the context of learning number and reasoning with numbers: counting, addition, subtraction, number sense, multiplication, division, and fractions. As time permits, we will also investigate decimals, percents, ratios, and proportions.

Goals

The goals of this class are for you to:

1. Learn to listen to and learn from children. This goal includes coming to see how capable children are of learning mathematics and solving problems; respecting children's mathematical thinking even when you do not understand it; and allowing what you learn from children to influence your own mathematical thinking and your teaching.
2. Act upon your listening in order to design and enact appropriate activities for children. This goal includes developing an understanding of how children make changes in their mathematical thinking; engaging in interactions with children that focus on conceptual understanding rather than rote memorization; and increasing your understanding of children's mathematical thinking in contrast with adult mathematical thinking.
3. Work actively to develop greater awareness of your own mathematical thinking. This goal includes rethinking your conceptions about the nature of mathematics; coming to understand aspects of your own mathematical thinking that you take for granted; and developing a habit of searching for foundational ideas in your own mathematical activity.
4. Participate in discussions about a wide range of current issues in mathematics education and research on children's mathematical learning. This goal includes co-creating an environment that is safe for students (both elementary school children and your classmates) to share and justify their thinking, ask questions, makes conjectures, and take risks. This goal also involves thinking about ways to design your future classroom to facilitate mathematical learning for all students.

*****Some of the most important “methods” you have as a teacher of mathematics are
(a) your own evolving, creative mathematical thinking; and
(b) your evolving understanding of your *students’* mathematical thinking and how it
can change through engaging students in productive mathematical activity.*****

Required Texts

Course packet from Bel-Jean Copy/Print Center, 163 East Broad Street, 548-3648. (\$14.70)

Kamii, C., & Housman, L. B. (2000). *Young children reinvent arithmetic* (2nd ed.). New York: Teachers College Press. (Available at the UGA Bookstore or on-line. ISBN #0-8077-3904-9. Amazon.com lists the price new at \$23.95 and used starting from \$19.99).

Optional Text

Van de Walle, J. A. (2001). *Elementary and middle school mathematics: Teaching developmentally* (4th ed.). New York: Longman.

Attendance

Attendance and participation are essential in this class, both for you to learn and so that others may benefit from your input. Attendance is expected because most of class time will be spent on group discussions and activities. The ideas and concepts we work on cannot easily be built up through class notes. You are responsible for all announcements made in class even if you are not there. It is important that you arrive promptly (especially when we are at Barrow Elementary School). Absences and tardiness will affect your grade.

Assignments

I will try to make the purpose of each assignment clear. If you have questions about the purpose of the assignment or what is expected of you, please ask. Late assignments will be assessed a penalty of one grade level. You are expected to demonstrate correct use of the English language with regard to grammar, punctuation, and spelling. I do grade on technical writing skills as well as content. Please proofread your work before turning it in to me. If you have weaknesses in the area of grammar, punctuation, or spelling, find someone who will proofread your work for you before you turn it in to me. It is expected that you will do your writing assignments (i.e., not mathematical problems) on a word processor. Any exceptions must be cleared with me in advance. Assignments that are not typed will be returned without a grade. **I would prefer that you turn in most writing assignments (i.e., not most problem sets) via the electronic course folder as I will explain in class, or send them to me as an email attachment. Label each assignment with your last name and the assignment number. For example, to turn in the counting analysis assignment, I would name the file “Hackenberg3.”**

University policies

All university policies with regard to withdrawals, early final exams, academic honesty, etc. will be strictly followed. It is your responsibility to be familiar with these policies.

ASSIGNMENT DESCRIPTIONS

1. MATHEMATICAL PROBLEMS

One of your greatest assets in understanding children's mathematics is understanding and deepening your own mathematical thinking, as well as your awareness about your mathematical thinking. Therefore, part of this course is about doing mathematics, generating mathematical conversation, and reflecting on your own mathematical knowledge. We will work on several mathematical problems over the course of the semester. **You do not need to type these assignments.** Please complete them legibly on paper. In some cases, you will turn in electronic files depending on the mathematical area we are exploring.

2. READINGS

For discussion in class, I will ask you to read articles from the course packet, from the required text, and from supplementary texts. In many cases I will ask you to do some informal writing in association with preparing a reading. In a few cases, I will ask you to write a more formal, polished commentary on or analysis of an article either in preparation for class or after class discussion. **All writing in response to readings should be typed.**

3. COUNTING ANALYSIS

Based on our class discussions and readings on how children count, analyze the counting activity of three different students (as provided in class). Your analysis should include what you can infer about the students' mathematical thinking, what kinds of counting activities you think would be appropriate for the child, and a rationale for why you have selected or designed these activities.

4. STUDENT INTERVIEW

On the first day at Barrow (probably Wednesday, September 28), you will interview your student to learn about her or his strengths and areas of potential development in mathematics. The purpose of this assignment is to provide you an opportunity to reflect on what you learn from the interview. Write a summary of the interview you conducted. The review should contain the following information:

General Information

- Your name
- The name, age, and grade of the student you interviewed
- The teacher's name
- Any pertinent information about the child you would like to mention

Your analysis

- Include all of the mathematical problems you posed and a brief summary of the child's response. Say more than "The child solved the problem correctly." Explain how the child solved the problem or what the child said to indicate that she or he could not solve the problem. Some children will not be able to explain how they solved a problem. If this happens, simply indicate this in your summary. Note any behaviors you see the child exhibiting such as counting on fingers or moving lips.
- What did you learn from this experience? Did anything surprise you?
- What, if any, implications does interviewing have for instruction?

Note: Avoid evaluative statements about the child, such as, “she was really smart” or “he seemed slow.” You do not know enough about the child to make such statements, and besides, those statements do not provide any information. Instead, provide details, such as, “When I asked her how many marbles she has if she started with 8 and her friend gave her 9 more, she solved it by saying ‘8 and 8 is 16, and one more is 17.’ I thought that was neat because I would not have expected a child to do that,” or “I asked him this question and he just looked at me. I asked him if I should repeat the question, and he said ‘no.’ I did not know how else to reach him.”

5. CASE ON BARROW BUDDY

Describe a pedagogical dilemma you encountered while interacting mathematically with your Barrow Buddy, and write it in a format similar to the cases we have read in class. The case should be approximately 2 pages long and should provide readers with enough detail so that they feel that they have personally experienced your dilemma. Use a pseudonym for the child’s name. Your case should be “open” (i.e., not resolved). Bring *three* copies of your case to class on the due date. You will turn one copy in to me and will give the other *two* copies to peers who will read your case and provide feedback.

6. FEEDBACK ON PEER CASES

You will receive two cases from peers on which you will provide feedback. For each case, provide a 1-2 page reaction to the case, giving suggestions for ways to resolve any problems or dilemmas in the case. Remember to address the data in the case rather than telling your own story in your feedback. Bring two copies of your feedback to class on—one for your peer and one for me. (You may write comments directly on the case you were given. However, you should also type a 1-2 page summary of your comments, ideas, and suggestions.)

7. LEARNING TRAJECTORY

Write a learning trajectory in essay form about moving from one mathematical topic to another with students. Use topics that we have worked on this semester so far. As we will discuss in class, formulating a learning trajectory can be the basis for writing many lesson plans, but a learning trajectory is not a plan for a single lesson—instead, it’s a big picture view of your goals and ideas. In your trajectory, describe how you will assess informally what your students know when you start and describe ideas for problematic situations that you will pose to different groups of students, based on your assessments, so that they might engage in productive mathematical activity. Be sure to justify your choices of problematic situations based on what mathematical thinking you are working to bring forth in your students.

I will ask for a draft of your learning trajectory, give you feedback, and then ask you to revise it into a final draft. I encourage you to get feedback from your peers on your drafts and revisions.

8. FINAL PORTFOLIO

The purpose of this assignment is to give you a chance to reflect on your growth over the semester and on the growth of your Barrow Buddy. You may be as creative as you wish in designing your portfolio. However, **remember that I am much more interested in the *substance* of what you have to say than the format in which you package it. So put most of your effort into the content of the portfolio.** Your portfolio should show evidence of reflection and analysis on the semester. **Do not simply create a “scrapbook” in which you tell a chronological story of your semester. I will give some guidelines for this assignment later in the semester.**

9. ACTIVITY REPORTS

For each session at Barrow you will need to prepare an activity report. Your activity report should consist of a description of the general objective(s) of the lesson, any activities that you used, any problems or successes the child had, and a brief description of what you plan to do in the next session. These activities should be described in enough detail that the classroom teacher can figure out what you did. Put most of your emphasis (both in effort and in writing) on analyzing the child's understanding of the concepts you were addressing. A sample activity report will be distributed to the class. **Your activity reports will be copied and given to the classroom teachers so that they can keep track of what their students are doing.** I will also make comments on your activity reports to provide you with suggestions for future sessions. In order for these comments to be useful to you in planning your next teaching session, I need to be able to read them and give you feedback before your next teaching session. Therefore, activity reports **must** be turned in to me at Barrow before you leave the school.

Please remember that you are a beginning teacher education student and that the comments on your activity report should be appropriate to your level of expertise. You are not qualified to label or diagnose a child as “LD,” “BD,” “dyslexic,” “hyperactive,” “gifted,” etc. Do not use such labels or other judgmental words in your activity report. Please remember that you are seeing this child for a very short period of time, which amounts to only a fraction of the time that child spends in school. You are also seeing the child in a highly specialized context, so the behavior (social or academic) the child exhibits with you may not be typical of her or his behavior during the rest of the school day. If you notice that your child is having some difficulty (or success) during your sessions, please describe the child's actions as carefully as possible **WITHOUT** using labels such as the ones listed above. For example, rather than writing “Joshua appears to be dyslexic,” write “Joshua consistently writes his 3’s and 7’s backwards. He generally writes his other numbers correctly. Sometimes he also makes his J’s backward when he writes his name.” Your goal is to accurately describe what the child is doing, not to diagnose any learning or behavior problems the child may have. It is appropriate for you to include questions on your activity report such as, “Should I correct Joshua every time he writes a letter or numeral backwards?”

At no time should your activity report make any judgmental comments about the child’s classroom teacher. It is not your place to question the teacher's methods, curriculum, assignments, or comments about a child. You will observe very little of the classroom teacher’s practices, so you will not be in a position to comment on them.

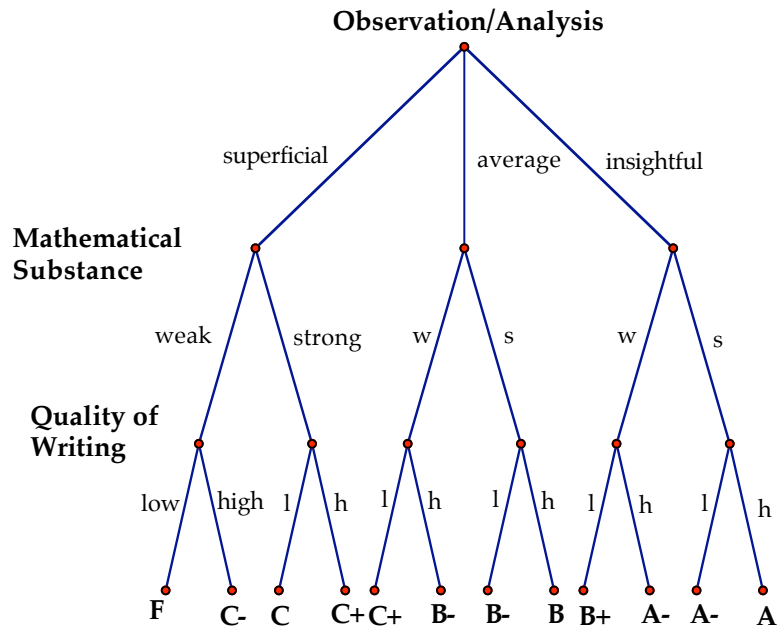
Grading

In general, I grade with rubrics, although I will use a point system for the final exam. The assignments listed above have this approximate weight in your final grade:

Assignment	Approximate Weight (percentage)
1. Mathematical Problems	10
2. Writings on Readings	10
3. Counting Analysis	10
4. Student Interview	5
5. & 6. Case on Barrow Buddy and Feedback on Peer Cases	10
7. Learning Trajectory, initial and revised drafts	10
8. Final Portfolio	15
9. Activity Reports	No grade
Professionalism	5
Final Exam (Monday, 12/12, 8:00-11:00 am)	25
Total	100

Your grade for Professionalism will be based on your punctuality and preparedness for class and Barrow teaching sessions, your class participation (which includes both your contributions and your reactions to the contributions of others), your response to constructive feedback in the classroom and at Barrow, and your demonstration of a professional demeanor (dress, language, attitude) toward others (professors, assistants, classroom teachers, peers, children).

Using the following rubric, I will assess writing assignments based on your interpretation and understanding of course content as well as on your quality of writing:



Using the following rubric, I will assess your work on mathematical problems based on your explanations, analysis, and correctness, as well as the quality of your explorations in your solutions:

