

ED326: Teaching Mathematics in the Elementary Grades
Colorado College
Block 1, 2008

Instructor: Sandie Gilliam

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Mission: The Education Department complements Colorado College's expressed mission in that its goal is to provide the finest educational studies possible within the liberal arts tradition. We challenge students to "develop those habits of intellect and imagination that will prepare them for learning and leadership throughout their lives."

Core Values: As members of the Colorado College community and Education Department, we are committed to:

1. Honor the life of the mind as central focus of our common endeavor; specifically, we hope to contribute to the development of individuals who are able to engage in critical thinking about the issues and complexities of educational subjects.
2. Value all persons and seek to learn from them their diverse experiences and perspectives; specifically, we expect to promote an environment in which students engage in inquiry, are open to diverse perspectives, consider evidence as the bases of determining individual outlooks, and appreciate that alternative approaches to solving problems may offer value.
3. Practice intellectual honesty and live with integrity; specifically, we expect students to pursue their studies with scholarly, conscientious, and ethical effort.
4. Encourage engagement and social responsibility; specifically, we hope that our students will contribute to the educational "life" of whatever community in which they live.

Course Materials:

Texts:

- 1) Ma, Liping. (1999). *Knowing and teaching elementary mathematics*. Mahwah, NJ: Lawrence Erlbaum Associates, Publishers
- 2) Rubenstein, Rheta (editor). (2004). *Perspectives on the Teaching of Mathematics*. Reston, VA: NCTM.
- 3) Chappell, Michael (editor). (2004). *Empowering the beginning teacher of mathematics: elementary school*. Reston, VA: NCTM.
- 4) National Council of Teachers of Mathematics. (2000). *Principals and Standards for School Mathematics*. Reston, VA: NCTM.

To gain access to the NCTM *Principles and Standards*, here are some options:

a) **Become a member of the National Council of Teachers of Mathematics (NCTM)** to establish yourself within this important organization and to gain access to valuable resources. A student membership costs \$38 for a year and will allow you online access to their *Principles and Standards*. Additionally, you will be given online access to one of their mathematics education journals (including back issues). I suggest that you request *Teaching Children Mathematics* (the journal for elementary school mathematics teachers). If you would like to purchase a paper copy of the *Principles and Standards*, as well as other resources and supplies, your membership will give you a discount.

The easiest way to become a member is online with a credit card, but it can also be done via the phone or by mail. For a student membership, you need to give the name and email of your instructor – Sandie Gilliam – _sandie.gilliam@coloradocollege.edu

- The main website for NCTM is <http://www.nctm.org>

- The link to the online student application follows:
<http://www.nctm.org/membership/default.aspx?id=56>

Soon after you register for membership you will receive a membership number and a password that will give you online access to the *Standards*, one of the math journals, and some other interesting “members only” links.

b) **Purchase the *Standards* without becoming a NCTM member** (\$53.95 plus shipping for the book and CD; \$34.95 plus shipping for just the CD).

c) **Sign up for a free 120-day access to the *NCTM Standards***. Go to: <http://standards.nctm.org/> and select “120-Day Free Access to Full Document.” You will be asked to give your name, email address, and a password. A caveat is that this is a **one-time only offer** from NCTM, so if you have done it in the past, you may not be able to do it again.

Additional Readings: Other required readings will be distributed during class or posted on our class webpage. They will be listed in the schedule or you will be informed of them during class.

Supplies:

- Composition Book (quadrille) for problem solving
- TaskStream (subscription required)

Course Objectives:

- To develop ways of thinking about mathematical content, students, and instruction in order to enhance teaching and learning of mathematics. (PB¹ 2)
- To examine and use the *NCTM Principles and Standards* and the *Colorado Model Content Standards in Mathematics*, and analyze their impact on mathematics education. (PB 2)
- To develop an understanding of mathematics as a coherent and connected body of knowledge. (PB 2)
- To develop an understanding of the role of various methods, materials, manipulatives, and technologies in elementary mathematics curriculum and instruction. (PB 5,6,7)
- To connect theories of learning with their implications for instructional practice in the elementary school mathematics classroom. (PB 5)
- To develop, implement, and reflect upon lesson plans appropriate for K-6 mathematics instruction. (PB 3)
- To develop strategies for incorporating language objectives into mathematics lessons, including attention to students whose first language is not English. (PB 1)
- To develop strategies for integrating problem solving into mathematics lessons. (PB 5)
- To develop strategies for differentiating instruction to meet students’ individual learning needs. (PB 6)
- To reflect on mathematics teaching and learning to enhance mathematical understanding. (PB 8)
- To develop strategies for continuing to learn about mathematics, students, and instruction related to teaching and learning mathematics in the elementary school. (PB 8)
- To develop strategies of integrating mathematics into other content areas.(PB 1,4)
- To develop and utilize a variety of formal and informal assessments to both measure achievement and to guide instruction. (PB 3)

¹ PB refers to *Performance-Based Standards for Colorado Teachers*

Requirements:

- a. Due to the nature of this course, attendance is mandatory. If it is impossible to attend you must notify the classroom teacher and me as to the circumstances.
- b. The following statement must be written on each assignment and signed by you:
“*On my honor, I have neither given nor accepted unauthorized aid on this examination (paper, report, etc.)*”.
- c. The following activities will be completed during the course:
 - Specific assignments listed on the Course Calendar.
 - Problem-solving journal.
 - Lesson plan that incorporates “math centers”.
 - Math Lesson Videotape and Reflection.
 - Cooperative evaluation. You will work as a teaching assistant each day, as indicated in your placement. Your evaluation and that of your teacher will be due near the conclusion of this course. A grade of at least “satisfactory” from the teacher is required.
 - Course evaluation via Survey Monkey.

Problem-Solving Journal:

Several times each week you will be given math problems to solve. In your journals, you will restate the problem in your own words, show **and** explain your process to solution, and then clearly state the answer. Each of the problems will cover the mathematical strand and levels with which we are working.

Math Lesson Videotape and Reflection:

You will be required to design a lesson plan that will develop students’ understanding of some aspect of one (or more) of the five content strands in *Principles and Standards*. Additionally, the lesson plan should incorporate some attention to the Communication process strand. Please work closely with your cooperating teacher in selecting an appropriate topic for your lesson plan. An initial draft of the lesson plan will be peer-reviewed during class. The working draft of this lesson plan will be turned in. You will teach and video this lesson in your placement class. Following your instruction of the lesson, you will watch your video and write a reflective paper that critiques the entire process. This paper should not be a description of what occurred during the lesson, but instead a critical analysis of your own pedagogical reasoning and action. The following areas should be covered in your paper:

Planning: *Describe how your lesson planning affected the outcome. What changes would you make in your planning process?*

Delivery of instruction: *Describe the aspects of the lesson that both went well and not so well. Why do you think this happened? Describe and analyze any “on the spot” changes to the lesson you might have made and why. What student misconceptions were apparent?*

Student learning: *Explain how your lesson impacted student understanding of the math strand, and justify your explanation. How did your use of the communication strand impact the student learning?*

Reflect and Revise: *What new understandings about mathematical content or pedagogy came about as a result of teaching this lesson? What would you change about this lesson before giving it again and why?*

In addition to your video and reflective essay, you must also submit copies of any materials used or produced in the lesson. (i.e. copies of text pages or handouts the students worked with, student work samples, etc.)

Evaluation Requirements: The elements that will go into determining grades for this course will be:

Class Participation consisting of:

- Readings, class assignments, & discussion 10%
- Class activities, discussion & reflection 10%
- Problem solving journal 15%

Course Projects consisting of:

- Lesson plan that incorporates the use of “math centers” 25%
- Mathematics Lesson Videotape and Reflection 40%

Deadlines must be met. Extensions will be granted only under dire circumstances on a case-by-case basis. Work submitted late will be penalized. Grades will drop one step below the grade earned for each day the assignment is late. (i.e. An A will turn to an A- after 1 day, a B+ after 2 days, etc.)

ED 326 (Tentative Assignment Schedule)

Monday, Sept 1

- Where's the Math? (2 pages): Describe the puzzles you worked on, your approach, what worked/didn't and why. Where/what was the math in each?
- KTEM: Introduction
- YB: Chapter 1 – (Equity and Access)

Tuesday, Sept 2 (1-2:15)- Meet in Library TLC2

- Problem of the Day #1 (in math journal). Restate problem in own words; show **and** describe your procedure (process to solution); and clearly state the answer.

Wednesday, Sept 3

- UMTM – all
- BTM: Pick a relevant chapter to read, based on what you and/or your teacher did today/doing tomorrow in math, and write a reflective paper (giving specifics) that compares/contrasts information read to what happened in your classroom.

Thursday, Sept 4

- PSSM: Chap. 1&2; pp. 37-47; 73-77; 143-146; pp. 90-106 (K-2) or pp. 158-175 (3-5)
- YB – Chapter 6 (Mathematics Teaching K-2)
- Problem of the Day #2

Friday, Sept 5

- PSSM: pp. 52-71; pp. 116-141 (K-2) or 182-209 (3-5)
- BTM: pick another chapter and write another reflective paper

Monday, Sept 8

- KTEM: Chap 4
- YB: Chap 5 (Language)
- Pick 3 problems from UMTM and explain (POD#3)

Tuesday, Sept 9 (1-2:15)

- BTM: Pick a third chapter and write reflective paper
- YB: Chapter 2 (Algebra)

Wednesday, Sept 10

- PSSM: pp32-36, 78-88, 148-156
- POD #4

Thursday, Sept 11

- KTEM: Chapters 1 & 2
- YB: Chap 7 (Japanese primary classrooms)

Friday, Sept 12 (library)

- PSSM: All sections relating to Probability & Data Analysis
- BTM: Pick a fourth chapter and write reflective paper.

Monday, Sept 15

- KTEM: Chapter 3
- POD #5

Tuesday, Sept 16

- Finish Lesson Plan that incorporates the use of “math centers”. Bring 9 copies of lesson plan and any “centers” handouts to class on Wednesday.

Wednesday, Sept 17

- YB: Chapter 10 (Family Math)
- YB: Chapter 11 (Problem Posing)

Thursday, Sept 18

- BTM: Pick a new chapter and write reflective paper.

Friday, Sept 19

- KTEM: Chap 5-7

Monday, Sept 22

Tuesday, Sept 23

Wednesday, Sept 24 – Class meets in the morning

Video and Reflection Project Due today

Knowing and Teaching Elementary Mathematics (KTEM)

Principles and Standards for School Mathematics (PSSM)

Using Math to Teach Math (UMTM):

www.msri.org/calendar/attachments/workshops/318/612msriThames.pdf

Perspectives on the Teaching of Mathematics (YB)

Empowering the Beginning Teacher of Mathematics: Elementary School (BTM)