1-2003

C&I 402.01: Elementary Mathematics Curriculum and Methods

Deborah Johnson
University of Montana - Missoula

C & I 402
Elementary Mathematics Curriculum and Methods
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phone: 243-6052
email: deborah.johnson@mso.umt.edu

Office Hours as posted or by appointment

"Mathematics is not a spectator sport. To learn mathematics, students must be engaged in exploring, conjecturing and thinking…"
NCTM, *Curriculum and Evaluation Standards for School Mathematics, 1989*

Overview:
The mathematics methods course offers the student the opportunity to build a conceptual and pedagogical framework for mathematics education, K-8. Throughout the course, the student will become acquainted with elementary and middle school mathematics topics, methods, and materials. In addition to content, other areas to be explored include: curriculum changes, current research in mathematics education, assessment practices, and professional organizations including the National Council of Teachers of Mathematics (NCTM).

The NCTM Standards (2000) will provide the basis for coursework. The standards place an emphasis on: problem solving, communicating mathematically, reasoning mathematically, valuing mathematics, using technology appropriately, and gaining confidence in one's ability to do mathematics. The Professional Standards are an addend to the Standards which we will use to guide a reflective practice on your teaching throughout the semester.

Student Objectives:
1. Students will explore the standards set forth by NCTM (2000) for the teaching of mathematics K-8. They will investigate topics within these standards and utilize appropriate methodology for varied levels of development.

2. Students will develop worthwhile tasks centered around the six Professional Standards for Teaching Mathematics of the NCTM Standards (1991) using a variety of teaching methods and/or materials.

3. Students will describe the different learning styles; individual, cultural and gender differences in children and make appropriate adaptations to their lessons.

4. Students will discover varied ways to assess and evaluate student progress in a mathematics curriculum. We will examine different types of rubrics and appropriate ways to use them.

5. Students will become acquainted with professional organizations and research activities that support and influence the teaching of mathematics.

Required Text:
Van De Walle, J. (2001) *Elementary and Middle School Mathematics. Teaching Developmentally.* White Plains, NY: Longman Publishing Company.

Also Required: FAC-PAC at Denny's Copy Stop, corner of Higgins/South.

Optional:

Texas Instruments (1995). *Uncovering Mathematics with Manipulatives and Calculators*. Jacksonville, TX: Author. (There are 2 levels, K-2 and 2-6) Partners can share.

Course Calendar The following is an approximate listing of the topics to be covered in the course and the related reading assignments from the text. You are expected to have read the assignments by the date listed. This list is **tentative**. Chapters are from the text. **FAC-PAC in BOLD**.

Week	Topic	Readings/ Assignments
1 Jan 27	Course Overview	
Jan 29	NCTM Standards/ Types of Instruction	Chap. 1; **pp.18-22;** Response 1
2 Feb 3	Planning/Videos	Chap. 2, 3; **pp. 28-33**
Feb 5	The Teacher/The Professional	Chap. 22; Response 2
3 Feb 10	Professional Standards – Worthwhile Tasks	Chap. 4. **pp. 34-46**
Feb 12	Literature	Chap. 11; **pp. 63-74;** Response 3,
4 Feb 17	**President's Day Holiday**	
Feb 19	Place Value	Research Paper
5 Feb 24	Reform vs. Traditional (textbooks review)	Chap. 16
Feb 26	The Primary Learner	Chap. 6, 7; Response 4
6 Mar 3	The Intermediate Learner	Chap. 10. **pp. 56-62**
Mar 5	Professional Standards - Analysis	Chap. 5, **pp. 95-109, 149-154**
7 Mar 10	Prof. Standards – Student's Role	**Chap. 8-9;** Response 5
Mar 12	Conferencing	.
8 Mar 17	TEACHING IN THE FIELD	
Mar 19	TEACHING IN THE FIELD	
10 Mar 31	Professional Standards – Tools	Chap. 24
Apr 2	Integrated Unit – Data Analysis -Chocolate	Chap. 18
11 Apr 7	Professional Standards - Environment	Chap. 23; Teaching I, Working w/student
Apr 9	MI in Mathematics	**pp. 47-55**
12 Apr 14	Fractions	Chap. 12, 13; Math lesson
Apr 16	TEACHING THEMATIC UNIT	
13 Apr 21	TEACHING THEMATIC UNIT	
Apr 23	TEACHING THEMATIC UNIT	
13 Apr 28	The Upper level learner	Chap. 14, 15, 21

Apr 30	Algebra	**Chap.** 19, 20; **pp. 69-79**
14 May 5	Spatial Problem Solving	Chap. 17, Thematic due
May 7	Math for All/closing video	.**Parent Response;** pp. 144-148

Week of May 12: Unit Presentations during Exam Week
Section 1 – **Thursday, May 15: 10:10-12:10** Section 2 - **Tuesday, May 13: 10:10-12:10**

Mathematics Requirements

Attendance/Participation (50 points) Attendance and participation are very important on a daily basis. Many pertinent ideas are discussed and covered only in class. Being present and actively participating are aspects of your grade. If you do need to miss, please call/leave a message – **a professional courtesy. You will be deducted 2 points for every class period missed (excused or not!)**

I. Foundations and Standards (15 pts. Each)
1. Response Paper: Read the literature provided in your Fac-Pac concerning constructivism in mathematics education. How does this relate to the way YOU were taught mathematics? How might your attitude about mathematics have been affected by a different approach (either positive or negative)? **Due: Jan. 29**

2. Response Paper: Compare/contrast the teaching styles of the teachers in the 2 videos using what you have learned about teaching mathematics. Describe which style **best** fits your personality and why. **Due Feb. 5**

3. Response Paper: Using the activities we have explored in class since the first day. Choose one of these activities. Describe which of the NCTM **process standards** the activity addresses and how it was addressed. What **content standards** does it address and how was that done? **Due: Feb. 12**

4. Choose a lesson from a traditional textbook. Describe how you could teach that lesson from a **constructivist** point of view. Include ideas concerning the manipulatives you might use, grouping strategies, etc. **Due: Feb. 26**

5. Response Paper: Use the rubric to analyze **ONE** set of problems in your **FAC-PAC**. (choose the level that most closely aligns with the grade level in your field placement) Include your rationale for why you scored the way you did. **Due: Mar. 10**

II. Research Paper
Research Paper (50 points) Pick a concept or topic relating to mathematics education under the Math Standard. Read about it in 2 different journal articles (NCTM publications, Teaching K-8), find a web site that is a good resource for this concept. Then find it being taught in 2 different textbooks (reform vs. traditional) from the list in your FAC-PAC p. 3. How do the textbooks handle the topic? You will be sharing your findings with the class. **Due: Feb. 19**

III. Teaching
Teaching I: (50 points) Prepare a hands-on minds-on lesson introducing a concept using manipulatives or technology that you will teach in your field placement. The DRAFT will be reviewed before you teach it. (sign up for a time to conference with me). Use the Rubric in your FAC-PAC for the lesson assessment. ATTACH the RUBRIC.

Teach the lesson in your field placement. Reflect as a team using the Professional Standards. **DRAFT Due : Mar. 7; Final Lesson Plan and Reflection Due: April 7**

Mathematics Lesson: (25 points) This can be any math lesson you teach in your field placement: A problem solving problem you pose or a lesson from the textbook used in your field placement classroom that you have altered to fit the constructivist philosophy. Be prepared as you would in the above teaching lesson and then **reflect on the teaching using the Professional Standards. Due: April 16**

IV. Working with a Student (25 pts.)
Do one problem solving activity with an **individual student. Why did you choose this type of a problem? How did the student respond? What did you learn about teaching mathematics?** Interview the student using some of the questions in your text pages 80-82 and/or from the Interviews and Conferences article in your Fac-Pac. Include the questions and responses in your write up. **Include student work/responses. Due: April 7**

V. The Teacher, the Professional (25 pts.)
A parent questions your approach to teaching mathematics. **Justify** the use of a problem solving/constructivist environment in your classroom using research you've read, observations you have made, standards, etc. Write as though you were speaking directly to the parent. **Due: May 7**

VI. Thematic Unit (100 points) Adhere to the Unit Outline given in seminar. Any questions, please ask! **Due: May 5**

Evaluation % A = 92-100, B = 84-91, C = 76-83, D = 68-75, F ≤ 67. All written assignments must be typed/printed on letter quality printer and are due at class time of the assigned day. **Late assignments are accepted ONLY with prior approval of the instructor. In cases where assignments are judged to be less than quality (<76%) students may request consideration for a rewrite of the assignment. This request must be made within 2 days following the return of the assignment. Revisions must be completed within 5 days following the revision agreement.**

Informative WEB SITES

http://www.mathforum.com/

Try the self-guided tour. Formulate a question to Ask Dr. Math. Get your students involved!

http://math.rice.edu/~lanius/Lessons/

This is an excellent site of interactive lessons students can do as a center, or you can lead them through it projecting it on a screen.

http://matti.usu.edu

This is another excellent interactive site for students to use as a center. Once in the site go to Virtual Library and select your math concept and grade band. Instructions, ideas for parent involvement, and NCTM Standards are included!!!

http://www.nctm.org --National Council of Teachers of Mathematics – your source for so much information

http://www.enc.org --Eisenhower National Clearinghouse for math and science materials.

http://owl.english.purdue.edu/handouts/research/r_apa.html – for APA Style