

EDMS 543 – Spring 2007 (21374)  
**TEACHING MATHEMATICS IN THE ELEMENTARY SCHOOL**  
Wednesday 8-14:50  
San Marcos Elementary School

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Course WebCT: <https://webct6.csusm.edu>

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The mission of the College of Education Community is to collaboratively transform public education by preparing thoughtful educators and advancing professional practices. We are committed to diversity, educational equity, and social justice, exemplified through reflective teaching, life-long learning, innovative research, and on-going service. Our practices demonstrate a commitment to student-centered education, diversity, collaboration, professionalism, and shared governance.

**Course Description and Goals:**

In this course, we will reflect on what it means to teach mathematics and explore curriculum development, methods, techniques, materials, planning, organization, and assessment in various elementary school curricula. Socio-political issues in mathematics education and methods of cross-culture language and academic development will also be integrated into the course. Learning to teach mathematics well is challenging and, therefore, this course will only begin your education in learning how to teach mathematics. This course is but one stage in your process of becoming a mathematics teacher.

We are expected to: (a) deepen our understanding of the mathematics taught at the elementary level, including such topics as place value, base systems, number theory, fractions, proportions, statistics, and algebra, (b) develop an understanding of the current issues and practices in mathematics education, (c) develop a familiarity with the NCTM and California learning standards, (d) develop an understanding of children's content specific thinking or the psychology of mathematical learning, (e) learn to teach content specific concepts using effective and appropriate strategies, including the educational use of technology, (f) practice how to teach for mathematical understanding, and (g) develop strategies to create a classroom environment that promotes the investigation and growth of mathematical ideas and to ensure the success of all students in multi-cultural settings.

**Required Materials:**

- Van de Walle, J. A. (2007). *Elementary and middle school mathematics: Teaching developmentally* (6<sup>th</sup> Ed.). Boston: Pearson Education, Inc.
- California Department of Education (2005). *Mathematics framework for California public schools: Kindergarten through grade twelve*. Sacramento, CA: Author. This document can be found at <http://www.cde.ca.gov/ci/ma/cf/index.asp>.
- STAR Test Blueprints for Standards Items: <http://www.cde.ca.gov/ta/tg/sr/blueprints.asp>
- National Council of Teachers of Mathematics (2000). *Principles and standards for school mathematics*. Reston, VA: Author. An overview of this document can be found at <http://standards.nctm.org/> (NCTM members have full access).

**Recommended Materials:**

- Carpenter, T. P., Fennema, E., Franke, M. L., Levi, L., & Empson, S. B. (1999). *Children's mathematics: Cognitively guided instruction*. Portsmouth, NH: Heinemann.
- Carpenter, T. P., Franke, M. L., & Levi, L. (2003). *Thinking mathematically: Integrating arithmetic & algebra in elementary school*. Portsmouth, NH: Heinemann.

**CSUSM Writing Requirement:**

This course will meet the 2,500 word writing requirement through the various course requirements (see assignments).

1

**Teacher Performance Expectation (TPE) Competencies:**

The course objectives, assignments, and assessments have been aligned with the CTC standards for Multiple Subject Credential. This course is designed to help teachers seeking a California teaching credential to develop the skills, knowledge, and attitudes necessary to assist schools and district in implementing effective programs for all students. The successful candidate will be able to merge theory and practice in order to realize a comprehensive and extensive educational program for all students. You will be required to formally address the following TPEs in this course:

**Primary Emphasis:**

- TPE 1a-Subject Specific Pedagogical Skills for MS Teaching (Mathematics)
- TPE 2-Monitoring Student Learning During Instruction

**Secondary Emphases:**

- TPE 3-Interpretation and Use of Assessments
- TPE 4-Making Content Accessible
- TPE 5-Student Engagement
- TPE 6a-Developmentally Appropriate Practices in Grades K-3
- TPE 6b-Developmentally Appropriate Practices in Grades 4-8
- TPE 6d- Developmentally Appropriate Teaching Practices for Special Education: Teaching the Special Education Population in the General Education Environment
- TPE 7-Teaching English Learners
- TPE 8-Learning About Students
- TPE 9-Instructional Planning
- TPE 10-Instructional Time
- TPE 11-Social Environment
- TPE 13-Professional Growth
- TPE 14-Educational Technology in Teaching and Learning

**Authorization to Teach English Learners:**

This credential program has been specifically designed to prepare teachers for the diversity of languages often encountered in California public school classrooms. The authorization to teach English learners is met through the infusion of content and experiences within the credential program, as well as additional coursework. Students successfully completing this program receive a credential with authorization to teach English learners.

**Requirements:**

*Participation and Disposition (10%)* – You are expected to actively participate in discussions, group work, presentations, and hands-on activities throughout the course. A positive professional disposition includes a willingness to consider and discuss new ideas objectively, curiosity, perseverance, and seriousness about improving one's self as a teacher. It can also include a sense of humor and social intelligence (e.g., the tact and ability to make others feel comfortable and to contribute).

*Reading Reflections (18%)* – You need to write six reflections. The first reflection consists of questions about your prior experience with mathematics. The questions will be given on the first day of class. For each of Week #2 to Week #6, you will need to write a "meaningful" one-page reflection on the articles assigned to be read for that week. These reflections must clearly articulate your thoughts on the articles. You are encouraged to make some connections with your teaching/learning experience and your field experience (e.g., your observation of elementary classroom activities). You can also raise questions for discussion and/or discuss how you might specifically apply what you learned from the articles as a teacher in the classroom. It is not necessary for you to repeat verbatim from the readings.

*Teacher and Student Interviews (32%)* - You need to conduct one teacher interview and three student interviews based on questions provided in class and/or your own invention. For each interview, you need to write a 2 to 3-page report. For the student interviews, you need to choose three mathematical topics from the following seven areas: (1) number concepts, (2) addition/subtraction, (3) multiplication/division, (4) fraction, (5) measurement/geometry, (6) data analysis/probability, and (7) algebra. For each student

interview, you will pose mathematical problems to any one student at a predetermined grade level. The purpose is to get you to begin thinking about students' mathematical understanding, to learn how to effectively pose questions and interpret the meaning of students' responses, and to provide you with an opportunity to interact with students. Please also submit the child's written work (if available).

*Mathematical Resources & Lesson* (34% total) – Working in small groups, your team will first compile resources on a predetermined mathematical topic (10 points) and then design a lesson that you will present in an elementary class (24 points). The purpose of this activity is to help you learn how to design effective mathematical activities, to provide you with an opportunity to begin compiling mathematical resources, and to provide an opportunity for you to practice teaching mathematics in an authentic classroom setting.

*Teacher Performance Expectation (TPE) Competencies* (6%) – You need to demonstrate that you have met TPE 1a and TPE 2 by submitting your reflection statements and providing artifacts as evidence. They should be posted on Taskstream.

Detailed information about the assignments will be given in class. You need to submit the assignments (except TPE reflections and children's work) at the course WebCT (access from <http://webct6.csusm.edu>). You are responsible for ensuring that assignments are submitted correctly and on time. Late assignments will receive a reduction in points unless *prior arrangements* have been made with the instructor.

**Grading Scale:**

Grades will be based on the following grading scale:

A.....90 -100%; A- .....87 - 89%; B+ ..... 83 - 86%;  
B.....80 - 82%; B- .....77 - 79%; C+ ..... 73 - 76%;  
C.....70 - 72%; D.....60 - 69%; F.....Below 60%

**Attendance Policy:**

COE policy: Due to the dynamic and interactive nature of courses in the College of Education, all students are expected to attend all classes and participate actively. At a minimum, students must attend more than 80% of class time, or s/he may not receive a passing grade for the course at the discretion of the instructor. Individual instructors may adopt more stringent attendance requirements. Should the student have extenuating circumstances, s/he should contact the instructor as soon as possible.

For this class, if you miss two class sessions (there are two sessions in a day), you will not receive a grade of "A". If you miss more than three class sessions, your highest possible grade is a "C+". Late arrivals and early departures will affect your final grade. Absences do not change assignment due dates. Please discuss with me any extenuating circumstances that will cause you to miss class *prior* to your absence. Attendance will be taken at each class session.

**CSUSM Academic Honesty Policy:**

Students will be expected to adhere to standards of academic honesty and integrity, as outlined in the Student Academic Honesty Policy. All written work and oral assignments must be original work. All ideas/materials that are borrowed from other sources must have appropriate references to the original sources. Any quoted material should give credit to the source and be punctuated with quotation marks.

Students are responsible for honest completion of their work including examinations. There will be no tolerance for infractions. If you believe there has been an infraction by someone in the class, please bring it to the instructor's attention. The instructor reserves the right to discipline any student for academic dishonesty in accordance with the general rules and regulations of the university. Disciplinary action may include the lowering of grades and/or the assignment of a failing grade for an exam, assignment, or the class as a whole.

**Students with Disabilities Requiring Reasonable Accommodations:**

Students must be approved for services by providing appropriate and recent documentation to the Office of Disabled Student Services (DSS). This office is located in Craven Hall 5205, and can be contacted by

phone at (760) 750-4905, or TTY (760) 750-4909. Students authorized by DSS to receive reasonable accommodations should meet with their instructor during office hours or, in order to ensure confidentiality, in a more private setting.

**Tentative Schedule:**

<b>Date</b>	<b>Session/Topic</b>	<b>Assignment to be completed BEFORE Class Session</b>
1/24/07	1. Introduction to mathematics education: Developing children's mathematical understanding 2. Problem solving	Van de Walle ch. 2, 3, 4
1/31/07	3. Designing instructions 4. Assessment & conducting student interviews (Classroom observation)	CA content standards Van de Walle ch. 6, 7 and Appendix A & B <b>Teacher interview due</b> <b>Math experience reflection due</b>
2/7/07	5. Number concepts & operations 6. Cognitively Guided Instruction	Van de Walle ch. 9, 10, 11 <b>Number concepts interview due*</b> <b>1<sup>st</sup> reading reflection due</b>
2/14/07	7. Place value (Group 1 presentation) 8. Whole-number computation (Group 2 presentation)	Van de Walle ch. 12, 13 <b>Add/sub interview due*</b> <b>Mult/div interview due*</b> <b>2<sup>nd</sup> reading reflection due</b>
2/21/07	9. Fractions (Group 3 presentation) 10. Team teaching 1	Van de Walle ch. 16, 17 <b>Fractions interview due*</b> <b>Lesson plan draft due</b> <b>3<sup>rd</sup> reading reflection due</b>
2/28/07	11. Measurement & geometry (Group 4 presentation) 12. TPE workshop	Van de Walle ch. 20, 21 <b>Measurement/Geo interview due*</b> <b>4<sup>th</sup> reading reflection due</b>
3/7/07	13. Data analysis & probability (Group 5 presentation) 14. Team teaching 2	Van de Walle ch. 22, 23 <b>Data anl/probability interview due*</b> <b>5<sup>th</sup> reading reflection due</b> <b>TPE reflections due</b>
3/14/07	15. Algebraic reasoning (Group 6 presentation) 16. Technology (Math resources presentations)	Van de Walle ch. 15, 8 <b>Algebra interview due*</b> <b>Math resources &amp; lesson plan due</b>

\* You just need to choose three of these seven topics for student interviews. The due dates vary. If you choose to do an interview on fractions, then your paper is due on 2/21. If you want to do an interview on algebra, then your paper is due on 3/14.

**STUDENT INTERVIEW GUIDELINES**

Student interviews are designed to provide you with opportunities to focus on a single child's thinking about mathematics. It will also help you to improve your use of inquiry for assessment purposes and to better understand students with different understandings.

**Prior to the interview**

- You should arrange with a teacher (or parent of a child you know) to interview one child for 20-30 minutes in a quiet place outside the classroom, if possible.
- Provide the teacher with some understanding of what the interview will involve and see if he/she has any thoughts about how this child will do on the assessment.

- Develop a list of “probing” questions you may want to use if the child is not forthcoming with a response. For example, if the child says “I just knew it”, you might respond with “What did you think about first?” or “If you were helping a friend, how would you explain what you did?”

### **During the interview**

Work with the child individually. Begin the interview by informing the child that you will be giving him/her a series of math problems to solve and that you are interested in his/her thinking process and in the strategies s/he uses to solve these problems. Inform the child that s/he can solve the problems in any way s/he wants. Please remind the child that the interview is voluntary and that s/he can end the interview at any time (if a student does end early then please find another willing student). Do everything you can to help make the child comfortable.

Pose problems one at a time. Orally provide the child with each problem and provide him/her with sufficient time to complete each problem. You may also want to provide the child with a written copy of each problem.

After the child answers each problem you should ask a variety of questions that will help you to better understand the child’s thinking and to assess his/her mathematical understanding. *You will want to note the questions you ask and the child’s responses* and it may be necessary to ask the child to wait while you are writing -- it is OK to ask the child to wait. *You should not tape-record/video-tape the interview without parental permission.*

During the interview, be sure to consider the following:

- The best thing you can be is genuinely curious. Remember the point of the interview is to discover how the child thinks -- *NOT* to guide the child to the correct answer (try to fight the urge to be “teacher”).
- Be careful to respond similarly to correct and incorrect answers. Be curious about all solution strategies -- not just the ones leading to incorrect solutions.
- Your primary role is to listen. Make sure you allow enough “wait time” -- children need time to think before answering.
- Make sure the child feels comfortable during the entire interview. If the child clearly cannot answer a problem, move on to the next problem. If you feel that the child is really struggling and frustrated, you may want to end the interview or give the child a problem you are fairly certain s/he can solve and then end the interview. If you cut an interview short because of student difficulty, be sure to discuss your reasoning in your write-up.

### **After the interview**

You should write a two to three-page report that includes a brief discussion on each of the following three points:

- What *specifically* did you learn about this child’s mathematical understanding? Here you will want to make some claims about the mathematics your student understands or doesn’t understand.
- What do your findings *mean*? What are their *implications* for math teaching and learning? I am looking for more of an explanation than just your student could or couldn’t solve a particular problem.
- What *specifically* might you do for this child if you were his/her teacher? Here you might want to include discussions about such issues as curriculum, instructional strategies, etc.

### **Grading**

I will be looking for nicely written papers that clearly and specifically express what you learned about: (1) the child’s mathematical understanding, (2) the implications of your findings for teaching, learning, and even curriculum, and (3) what you would do next for this child if you were his/her teacher (again be specific here). For example, you might recognize that this student lacks a conceptual understanding of multiplication – so as this child’s teacher you might want to pose meaningful problems related to multiplication, etc.

\*NOTE: When you turn in your write-up, you should also include the child’s written work (if it exists) and without the student’s “actual” name listed. You can use a pseudonym in your report.

## MATHEMATICAL RESOURCES & LESSON PLAN ASSIGNMENT

### Part I. Mathematical Resources

Your group will construct an **Annotated List of Resources** that your fellow colleagues will find helpful when teaching your mathematical topic to students. Your list should include resources that **directly relate to your mathematical topic (e.g., telling time, triangles, etc.)**. For example, you should include such things as children’s literature, teacher support materials, manipulatives, WWW locations, research articles, videos or movies, software, etc. Please provide a short description of each resource, including any useful information that you find when researching your topic, so that your colleagues can learn from your work (but do not include duplicated pages from teacher workbooks, rather provide citations along with short descriptions of your resources). I will be looking to find well-constructed packets of information. If you partition the workload, it should not be an overwhelming task. If each group prepares a packet of materials that is filled with important resources, and we share that information in class, then you will each have a wealth of information on some of the important mathematical resources for use when you teach. A general "rule of thumb" might be for your group to try and find 10 resources. Some topics will naturally have more resources than other topics.

Your group will need to turn in one nicely prepared copy of your List of Resources on the day of your group presentation. Your group should also be prepared to make a 5 to 10-minute presentation that highlights some of the resources you found (consider bringing in a few of the items that you found most helpful when planning your presentation and resources for these materials).

This project is purposefully open-ended in the hopes that you will go out and find some great resources for your mathematical topic and for your presentation. You should talk with your master teachers, use the Internet, and make use of materials I provide. However, if you have any questions or challenges finding resources, please be sure to ask (I am happy to provide support...I want these to be good so they are good resources)!

### Grading:

	<b>0-4 pts Developing</b>	<b>6 pts Nearly Meets</b>	<b>8 pts Meets</b>	<b>10 pts Exceeds</b>
<b>TPE 4</b> Making Content Accessible	Candidates’ resources and descriptions will demonstrate little to no understanding of how instructional resources can help provide all students with access to a balanced and comprehensive curriculum.	Candidates’ resources and descriptions will demonstrate some understanding of how instructional resources can help provide all students with access to a balanced and comprehensive curriculum.	Candidates’ resources and descriptions will demonstrate considerable understanding of how instructional resources can help provide all students with access to a balanced and comprehensive curriculum.	Candidates’ resources and descriptions will demonstrate exceptional understanding of how instructional resources can help provide all students with access to a balanced and comprehensive curriculum.

### Secondary TPE’s for this assignment

- TPE 1a – Subject-Specific Pedagogical Skills for MS Teaching Assignments (Mathematics)
- TPE 5 – Student Engagement

## Part II. Designing & Teaching a Lesson in Mathematics

You will participate in small groups (approximately four to six members) to design, construct, and teach a single lesson on an assigned mathematical topic. The lesson will be designed for use with students at a specific grade level (based on the grade level of the cooperating teacher). The purpose of this activity is to help you learn how to design effective mathematical lessons for a specific group of students, provide you with an opportunity to practice teaching mathematics and to receive feedback, and to learn how to effectively collaborate with colleagues in order to improve your teaching.

### Plan of Action:

When planning your lesson, each group should:

- Clearly identify the objective(s) of your lesson within the context of the overall goals and objectives of the unit.
- Identify students' prior knowledge before making decisions about curriculum and instructional practices.
- Consider whether your curriculum clearly brings forward your mathematical objective(s) and what, if any, alterations are necessary. Furthermore, your lesson must be consistent with the Mathematics Framework for California Public Schools (e.g., Content Standards).
- Each group will be required to meet with me at least one time prior to the date of your teaching (this is not to say that we can only meet once!). One of the primary purposes of this activity is to provide me with an opportunity to work with each of you on a more individual basis so that I can help you learn to design effective mathematical activities. I will be happy to provide you with suggestions after you have given it some thought.
- Make sure that each member of the group participates fully in the design and implementation of the lesson and that the workload is shared equitably.
- Your team will teach the lesson in a classroom. Other terms will observe your teaching and provide feedback. On the day of your teaching, you need to submit a draft version of the lesson plan. It should follow the format discussed in your Teaching and Learning Course.
- After the lesson, you will need to revise the lesson plan based on students' responses and the feedback you receive from other teams.
- You will then teach the revised lesson on another day. Submit the revised lesson plan for grading.

### Grading:

	<b>1 pt Developing</b>	<b>2 pts Nearly Meets</b>	<b>3 pts Meets</b>	<b>4 pts Exceeds</b>
<b>TPE 1, 1a</b> Subject Specific Pedagogical skills for MS Teaching Assignment (Mathematics)	Candidates' lesson plan and presentation demonstrates little to no understanding of how to teach the state adopted academic content standard in mathematics.	Candidates' lesson plan and presentation demonstrates some understanding of how to teach the state adopted academic content standard in mathematics.	Candidates' lesson plan and presentation demonstrates considerable understanding of how to teach the state adopted academic content standard in mathematics.	Candidates' lesson plan and presentation demonstrates exceptional understanding of how to teach the state adopted academic content standard in mathematics.
<b>TPE 2</b> Monitoring Student Learning During Instruction	Candidates' lesson plan and presentation demonstrates little to no understanding of how to monitor student learning and how to effectively	Candidates' lesson plan and presentation demonstrates some understanding of how to monitor student learning and how to	Candidates' lesson plan and presentation demonstrates considerable understanding of how to monitor student learning	Candidates' lesson plan and presentation demonstrates exceptional understanding of how to monitor student learning

	make use of this information when teaching.	effectively make use of this information when teaching.	and how to effectively make use of this information when teaching.	and how to effectively make use of this information when teaching.
<b>TPE 4</b> Making Content Accessible	Candidates' lesson plan and presentation will demonstrate little to no understanding in the use of pedagogical strategies that will provide all students access to the mathematics curriculum.	Candidates' lesson plan and presentation will demonstrate some understanding in the use of pedagogical strategies that will provide all students access to the mathematics curriculum.	Candidates' lesson plan and presentation will demonstrate considerable understanding in the use of pedagogical strategies that will provide all students access to the mathematics curriculum.	Candidates' lesson plan and presentation will demonstrate exceptional understanding in the use of pedagogical strategies that will provide all students access to the mathematics curriculum.
<b>TPE 6, 6a, 6b</b> Developmentally Appropriate Teaching Practices – Grades K-3 & 4-8	Candidates' lesson plan and presentation will demonstrate little to no understanding in the use of developmentally appropriate teaching practices.	Candidates' lesson plan and presentation will demonstrate some understanding in the use of developmentally appropriate teaching practices.	Candidates' lesson plan and presentation will demonstrate considerable understanding in the use of developmentally appropriate teaching practices.	Candidates' lesson plan and presentation will demonstrate exceptional understanding in the use of developmentally appropriate teaching practices.
<b>TPE 9</b> Instructional Planning	Candidates' lesson plan and presentation will demonstrate little to no understanding in how to plan an effective lesson.	Candidates' lesson plan and presentation will demonstrate some understanding in how to plan an effective lesson.	Candidates' lesson plan and presentation will demonstrate considerable understanding in how to plan an effective lesson.	Candidates' lesson plan and presentation will demonstrate exceptional understanding in how to plan an effective lesson.
Lesson Plan Format	Candidates' lesson plan demonstrates little to no understanding of COE lesson plan format.	Candidates' lesson plan demonstrates some understanding of COE lesson plan format.	Candidates' lesson plan demonstrates considerable understanding of COE lesson plan format.	Candidates' lesson plan demonstrates exceptional understanding of COE lesson plan format.

Secondary TPE's for this assignment

- TPE 5 – Student Engagement
- TPE 10 – Instructional Time
- TPE 11 – Social Environment

**SB 2042 - AUTHORIZATION TO TEACH ENGLISH LEARNERS COMPETENCIES**

<b>PART 1: LANGUAGE STRUCTURE AND FIRST- AND SECOND-LANGUAGE DEVELOPMENT</b>	<b>PART 2: METHODOLOGY OF BILINGUAL, ENGLISH LANGUAGE DEVELOPMENT, AND CONTENT INSTRUCTION</b>	<b>PART 3: CULTURE AND CULTURAL DIVERSITY</b>
<b>I. Language Structure and Use: Universals and Differences (including the structure of English)</b>	<b>I. Theories and Methods of Bilingual Education</b>	<b>I. The Nature of Culture</b>
A. The sound systems of language (phonology)	A. Foundations	A. Definitions of culture
B. Word formation (morphology)	B. Organizational models: What works for whom?	B. Perceptions of culture
C. Syntax	C. Instructional strategies	C. Intra-group differences (e.g., ethnicity, race, generations, and micro-cultures)
D. Word meaning (semantics)	<b>II. Theories and Methods for Instruction In and Through English</b>	D. Physical geography and its effects on culture
E. Language in context	A. Teacher delivery for <u>both</u> English language development <u>and</u> content instruction	E. Cultural congruence
F. Written discourse	B. Approaches with a focus on English language development	<b>II. Manifestations of Culture: Learning About Students</b>
G. Oral discourse	C. Approaches with a focus on content area instruction (specially designed academic instruction delivered in English)	A. What teachers should learn about their students
H. Nonverbal communication	D. Working with paraprofessionals	B. How teachers can learn about their students
I. Language Change		C. How teachers can use what they learn about their students (culturally responsive pedagogy)
<b>II. Theories and Factors in First- and Second-Language Development</b>	<b>III. Language and Content Area Assessment</b>	<b>III. Cultural Contact</b>
A. Historical and current theories and models of language analysis that have implications for second-language development and pedagogy	A. Purpose	A. Concepts of cultural contact
B. Psychological factors affecting first- and second-language development	B. Methods	B. Stages of individual cultural contact
C. Socio-cultural factors affecting first- and second-language development	C. State mandates	C. The dynamics of prejudice
D. Pedagogical factors affecting first- and second-language development	D. Limitations of assessment	D. Strategies for conflict resolution
E. Political factors affecting first- and second-language development	E. Technical concepts	<b>IV. Cultural Diversity in U.S. and CA</b>
		A. Historical perspectives
		B. Demography
		C. Migration and immigration