TEACHING MATHEMATICS IN THE ELEMENTARY SCHOOL
EDMS 543 – Spring 2005
Alvin Dunn Elementary School

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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.

REQUIRED MATERIALS:

- California Department of Education (2000). Mathematics Content Standards for California Public Schools, Kindergarten Through Grade Twelve. Sacramento, CA: author. This document can be found on the WWW at: http://www.cde.ca.gov/ci/ma/cf/index.asp (I highly encourage students to purchase this publication).
- National Council of Teachers of Mathematics (2000). Principles and standards for school mathematics. Reston, VA: author. Can be found on the WWW at: http://standards.nctm.org/
- Star Test Blueprints for Standards Items: http://www.cde.ca.gov/ta/tg/sr/blueprints.asp
- Van de Walle, John A. (2004). Elementary and middle school mathematics: Teaching developmentally (5th ed.). Boston: Pearson Education, Inc.

COURSE PREREQUISITES:

Admission to the Multiple Subject Credential Program is the only prerequisite. *Course requires participation/observation in the public schools.

COURSE DESCRIPTION:

Focuses on how curriculum development, methods, techniques, materials, planning, organization and assessment in various elementary school curricula; and curriculum integration. Methods of cross-cultural language and academic development will be integrated into the course.

Learning to teach mathematics well is difficult and, therefore, you must expect that this course will only begin your education in learning how to teach mathematics. This course is but one stage in what I hope will be a continuing evolution of you as a mathematics teacher. More specifically, the focus of this course will be on (1) developing an understanding of the current practices in mathematics, (2) learning to teach content specific concepts using effective and appropriate strategies, and (3) practicing how to teach for mathematical understanding. Enfolded into this course will be curriculum development, developing an understanding of children's content specific thinking, creating a classroom environment that promotes the investigation and growth of mathematical ideas, and developing strategies to ensure the success of all students in multi-cultural settings.

CSUSM WRITING REQUIREMENT:

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

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

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.

KEY ASSIGNMENTS:

Reading Reflections (21%) - Each week students will 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** and discuss how you might **specifically apply** what you learned from the articles as a teacher in the classroom.

Student Interviews (24%) - You and one of your classmates will conduct a series of four different student interviews based on questions provided in class. For each 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' answers, and to provide you with an opportunity to interact with students.

Mathematical Resources & Lesson (35% total) – Working in small groups, your team will first compile resources on a predetermined mathematical topic (20%) and then design a lesson that you will present in an elementary class (15%). 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.

Connecting Theory and Practice (20%) – Students will keep a journal that will record what they learn, their thoughts, observations, etc. as a result of their weekly participation in a classroom at Alvin Dunn Elementary School. During these weekly sessions students will be working with students in mathematics as a tutor, assistant, and teacher. In addition to the journal, students will submit a three page reflection that will consider the theory they utilized while working with students in mathematics in their classroom.

GRADING SCALE:

Grades will be based on the following grading scale:

A.....90 -100%
B.....80 - 89%
C.....70 - 79%
D.....60 - 69%
F.....Below 60%

ATTENDANCE 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.

If you miss two class sessions or are late (or leave early) more than three sessions, you will not receive a grade of "A". If you miss three class sessions, your highest possible grade is a "C+". 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. Furthermore, grades on assignments turned in late will be lowered unless **prior arrangements** have been made with the instructor.

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.

SB2042 – AUTHORIZATION TO TEACH ENGLISH LEARNERS COMPETENCIES

TEST 1: LANGUAGE STRUCTURE AND FIRST- AND SECOND-LANGUAGE DEVELOPMENT	TEST 2: METHODOLOGY OF BILINGUAL, ENGLISH LANGUAGE DEVELOPMENT, AND CONTENT INSTRUCTION	TEST 3: CULTURE AND CULTURAL DIVERSITY
I. Language Structure and Use: Universals and Differences (including the structure of English)	**I. Theories and Methods of Bilingual Education**	**I. The Nature of Culture**
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.** Intragroup differences (e.g., ethnicity, race, generations, and micro-cultures)
D. Word meaning (semantics)	**II. Theories and Methods for Instruction In and Through English**	**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	**II. Manifestations of Culture: Learning About Students**
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 ***
II. Theories and Factors in First- and Second-Language Development	**III. Language and Content Area Assessment**	**C.How teachers can use what they learn about their students (culturally responsive pedagogy)***
A. Historical and current theories and models of language analysis that have implications for second-language development and pedagogy	**A. Purpose**	**III. Cultural Contact**
B. Psychological factors affecting first- and second-language development	**B. Methods ***	**A.** Concepts of cultural contact
C. Socio-cultural factors affecting first- and second-language development	**C. State mandates**	**B.** Stages of individual cultural contact
D. Pedagogical factors affecting first- and second-language development *	**D. Limitations of assessment**	**C.** The dynamics of prejudice
E. Political factors affecting first- and second-language development	**E. Technical concepts**	**D.** Strategies for conflict resolution
		IV. Cultural Diversity in U.S. and CA
		A. Historical perspectives
		B. Demography
		C. Migration and immigration

Date	Session Number and Topic	Assignment to be Completed BEFORE Class Session
Wed 1/19/05	1. Introduction to Mathematics Education 2. Developing Mathematical Understanding	Van de Walle ch. 2 Van de Walle ch. 3
Wed 1/26/05	3. Problem Solving 4. Standards	Van de Walle ch. 4 CA Content Standards/NCTM Assignment
Wed 2/2/05	5. Lesson Study & Working Groups 6. Assessment and Student Interviews	(http://www.lessonresearch.net) – read "A Lesson is Like a Swiftly Flowing River" Van de Walle ch. 5
Wed 2/9/05	7. Instructional Practices 8. Technology	Van de Walle ch. 6, 7, 8
Wed 2/16/05	9. Addition and Subtraction 10. Multiplication and Division	Van de Walle ch. 9, 10, 11, 13 ***Student Interview #1 Due Today** ***Mult/Div Interview Due (option 2)**
Wed 2/23/05	11. Number Concepts 12. Fractions, Decimals, Percents, Ratio & Proportion	Van de Walle ch. 12, 14 Van de Walle ch. 15, 16, 17, 18 ***Number Concepts Intrvw Due (option 2)** ***Fractions Interview Due (option 3)**
Wed 3/2/05	13. Algebraic Thinking 14. Measurement & Geometry	Van de Walle ch. 22, 23 ***Algebra Interview Due (option 3)** Van de Walle ch. 19, 20 ***Meas/Geo Interview Due (option 4)**
Wed 3/9/05	15. Data Analysis & Probability 16. Wrap-up	Van de Walle ch. 21 ***Data Anal/Prob Interview Due (option 4)** Bring Questions to Ask ***Theory-Practice Assignment Due Today**

STUDENT INTERVIEW GUIDELINES
EDMS 543

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

I prefer that students work together with a partner on these interviews so that you will have a colleague for collaboration. As a pair, you will interview one child for each content interview and together write up your evaluation of the student (please also submit the child's written work attached to your paper).

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 contain and see if he/she has any thoughts about how this child will do on the assessment.

- Develop a list of 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.

Orally provide the child with each problem, posing them one at a time, you received from class 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 (and your partner) should **together** write no more than a two page reflection that includes a brief discussion on each of the following two 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. 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:

Each interview will be worth a total of 6 points (24 points (or 24%) total). More specifically, I will be looking for nicely written papers that clearly and specifically express what you learned about: 1) the child's mathematical understanding and 2) 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.

MATHEMATICAL RESOURCES ASSIGNMENT
EDMS 543

In preparation for your Classroom Presentation Assignment, your "content 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., algebra, geometry, 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 include 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 in each of the areas mentioned. 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 in on the day of your group presentation. Your group should also be prepared to make a 5 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)!

DESIGNING & TEACHING A LESSON IN MATHEMATICS
EDMS 543

Students will participate in small groups (approximately four to six students) to design, construct, and teach a single lesson on an assigned mathematical topic. The lesson will be designed for use with children 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, learn where to find mathematical resources, 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:

1. Clearly identify the objective(s) of your lesson within the context of the overall goals and objectives of the unit. Similar to the Japanese Lesson Study process, your group might also want to identify a specific problem or issue that needs resolution.

2. Identify students' prior knowledge before making decisions about curriculum and instructional practices.

3. 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).

4. Each group will be required to meet with me at least one time prior to the date of your presentation (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.

5. 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. As part of your written report, each member must include a short written evaluation that describes the contributions made by each member of the group (indicating whether the workload was shared fairly among the members of the group).

6. On the day your topic is to be discussed in class, your group will turn in a lesson plan for your activity (using the format discussed in your Curriculum & Instruction Course), a reflection of your group's collaboration process and the teaching of your lesson, and a paragraph from each member that describes how the workload was shared. Each group will email a copy of your lesson plan and mathematical resources to each of your classmates for their teaching files.

7. Each group will either show a short snippet of your actual lesson to the class for discussion or will allow others to observe the actual lesson (we will discuss the options).

Grades:

For this activity, which will be worth a total of 15 points (15%), I am as interested in the process your group goes through as much as the final product. I want this to be an opportunity for you to learn such things as where to go for mathematical resources, to learn how to prepare lesson plans and what to consider when writing a lesson plan, to recognize the many challenges of teaching mathematics, to learn how to reflect and critique lessons, and to begin to understand the importance of on-going professional development opportunities. Your grade on this assignment will be based on the following:

- The design of your lesson plan. For example, adheres to identified lesson plan format described in your Curriculum and Instruction course, adheres to the California Content Standards, makes good use of student thinking, is grade appropriate, is sensitive to the needs of all students, and includes a plan for assessment, etc.

- The level of collaboration among the members of your group, the depth of your reflections (collaboration and teaching of the lesson), and what you learned from this process. You must be willing to take risks, commit yourself fully to this process, and desire to learn as much as possible from others and from the process. The success of this lesson depends on how much YOU put into this activity!

- As discussed earlier, each member of the group will need to include a short paragraph that describes how the work was shared among the members of the group (was the work shared fairly?). If the overall group identifies one member that did not fairly contribute to the final product then I will likely lower the grade of that individual (please work together and share the workload).

- Although the actual presentation of the lesson will NOT be factored into your grade, each group will receive feedback. I believe that this is a time for you to try things out and to make mistakes, not to be judged. Don't be afraid to take some risks and to make mistakes.

*** If anything is unclear or if you ever have questions, please ASK me.**

CONNECTING THEORY AND PRACTICE
EDMS 543

This assignment is designed to help solidify the connection between Theory and Practice related to the teaching and learning of mathematics. The goal is for you to be able to make informed teaching decisions in the classroom that are informed by theory and research. As part of this course you will be required to keep a comprehensive journal (approximately two pages for each day) that will record what you do each day that you work in your assigned Alvin Dunn classroom, identifies areas you feel challenged, records questions or concerns you have, discusses observations/revelations of what works and what does not work, etc. In addition to making use of your textbook and lecture information, you will be encouraged to ask questions during class in order to help connect your classroom experiences to the theory that will help inform your work with students in the classroom.

In addition to the journal, you will be required to write a 3-4 page paper that describes some of the connections you made between theory and practice. You might describe the issues you identified as a result of your classroom participation (e.g. what challenged you, what did you notice worked, etc.) and then describe what theory you connected to the identified issue and what, if any, outcome came from your work in the classroom (e.g. did you apply new theory to the classroom and how did it work?). Again, the purpose is to connect theory and practice so just describe how you made use of the theory in practice and the result of this application (if any).

You should record your classroom reflections after each class session and make connections to theory each week so that it is meaningful and so you can try it out the following week. Please do not wait until the last week to do this assignment as it will really defeat the purpose of the assignment.

Grading:
This assignment will be worth 20 points (or 20% of your overall grade). I will be looking for journals and reports that are insightful, specific, are well written, and provide supporting documentation to support your discussion. You will need to dig into the theory to make your connections – go deep and not just describe surface issues. Please be specific and give examples whenever possible.