

EDST 621 – Spring 2007 (22077)  
**CHILDREN'S THINKING IN MATHEMATICS**  
Tuesday 16:00-21:45  
San Juan Capistrano Unified School District

Instructor: Rongji Chen, Ph.D.

Office: 309 University Hall

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

Office hours: Before and after class and by appointment (given off-campus location); feel free to call or e-mail me to set up a convenient time to meet.

Office phone: (760)750-8509

Email: rchen@csusm.edu

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 investigate both cognitive and affective issues in the teaching and learning of mathematics. We will also become familiar with the related major areas of research. More specifically, we will examine: (a) the ways in which students learn mathematics., (b) the role of affect in the teaching-learning process, (c) the developmental trajectories that students pass through as they come to develop an understanding of specific mathematical ideas, (d) the understanding of mathematics that students bring with them to class (including realistic contexts), (e) common student misconceptions in mathematics, and (f) how educators can support teacher change by making use of children's thinking and feelings.

**Required Materials:**

- Several articles are required and will be available for download.

Choose at least one from the following *Research Ideas for the Classroom* series:

- Jensen, R. J. (Ed.). (1993). *Research ideas for the classroom: Early childhood mathematics*. New York: Macmillan.
- Owens, D. T. (Ed.). (1993). *Research ideas for the classroom: Middle grades mathematics*. New York: Macmillan.
- Wilson, P. S. (Ed.). (1993). *Research ideas for the classroom: High school mathematics*. New York: Macmillan.

**Recommended Materials:**

- Resnick, L. B., & Ford, W. W. (1981). *The psychology of mathematics for instruction*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Brahier, D. J. (2001). *Assessment in middle and high school mathematics: A teacher's guide*. Larchmont, NY: Eye on Education.
- 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.
- Burns, M. (1975). *The I hate mathematics! book*. Boston: Little, Brown and Company. (Readers suggest that reading this book might help children overcome math anxiety.)

**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).

*Three Reading Reflections (24%)* - Each month you will need to write a "meaningful" 2-3 page reflection on the articles assigned to be read for that month. 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. You are encouraged to raise questions for discussion. It is not necessary for you to repeat verbatim from the readings.

*Cognitive and Affective Issues in the Teaching and Learning of Mathematics (36%)*: This project has four components:

Part I. Personal reflections on mathematics (6%)

- a) Make a drawing of what comes to mind when you think about mathematics (i.e., what mathematics is to you?). Provide a caption for your picture. Write a brief explanation of your drawing.
- b) Draw a picture of a mathematician. Define a mathematician.
- c) Write a one to two-page reflection on your experience as a mathematics student (you can start at Kindergarten if you wish!). Position yourself concerning how "good" you are in math. Discuss your feelings about math, your perception of yourself as a math learner and teacher. Mention those who were important in your "math learning history"-they can be ex-teachers, family, friends, and they may have impacted you positively or negatively.

Part II. Teacher and student interviews (12%)

Interview at least one teacher and at least four students (from two different classrooms) about their experience with mathematics. An interview protocol will be provided in class. Analyze and classify their responses as primarily involving affective issues or as primarily involving cognitive issues. (a) Summarize your results in a 2 to 3-page report, especially considering what your results suggest about the importance of affect in the classroom. (b) Present your findings in class.

Part III. Attitude scale (group work, 6%)

Devise an attitude scale for gauging students' disposition toward mathematics. You may wish to include items that gauge students' feelings about specific aspects of mathematical instruction such as doing worksheets, solving word problems, or working in groups. Some sample items will be provided in class.

Part IV. Survey (12%)

Administrate the attitude scale (survey) in your class. Write a 3 to 4-page report of your findings. Use appropriate graphs in your report. You will also need to share your findings with the class.

*Misconceptions in Mathematics (30%)*: Working in small groups, you will identify a topic in mathematics that is often misunderstood by students. You will observe and interview students as they learn about the mathematical topic. Your joint paper should provide examples of the students' misconceptions, analyze the nature of students' difficulties in learning this topic, describe how teachers may help reinforce these misconceptions, and suggest some ways that teachers may correct these misconceptions. Your paper should include at least two references to support your view and be no longer than 5 pages double-spaced. You will also need to present this project.

Detailed information about the assignments will be given in class. You need to submit your assignments at the course WebCT (access from <http://webct6.csusm.edu>).

**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.

If you miss one and a half 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.

**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</b>
1/30/07	1. Introduction 2. Developing an understanding of mathematics	
2/20/07	3. Relational understanding and instrumental understanding 4. The role of affect in the teaching-learning process (Presentations of interview results)	- Reading reflection 1 - Personal reflections about math - Teacher and student interviews
2/27/07	5. Assessment 6. Assessment and instruction	
3/20/07	7. Attitude survey presentations 8. Cognitively Guided Instruction	- Reading reflection 2 - Attitude scale - Attitude survey report
3/27/07	9. Content area investigation 10. Content area investigation	
4/17/07	11. Misconceptions 12. Misconceptions	- Reading reflection 3
5/1/07	13. Misconception presentations 14. TBD	- Misconceptions in Mathematics