CHILDREN’S MATHEMATICAL THINKING (MTHED 212)
Spring 2015

8:00 a.m.-10:40 a.m., Tuesdays
Class held at SDSU in EBA340 on Jan 27, Feb 3, 17, 24 & Mar 10
Class held at Hardy Elementary on Feb 10 & Mar 3

Instructor: Dr. Alexander “Sasha” Chizhik
Email: achizhik@mail.sdsu.edu
Office hours: By appointment

Required Course Materials
- IMAP Integrating Mathematics and Pedagogy to Illustrate Children’s Reasoning
  (CD available in the SDSU bookstore)
- Blackboard (https://blackboard.sdsu.edu/)
- Photo camera (phone will work)

Introduction
In this class you will consider issues related to children’s mathematical thinking. We will analyze these issues by reading summaries of research, viewing videos of students’ doing mathematics, and finally interviewing children ourselves. We will also reflect upon our own mathematical thinking, as we solve mathematics problems together, trying to make sense of children’s methods. The purpose of this course is to use your early professional development to share experiences and develop insight into how younger children approach mathematics. Thereby, you should be able to incorporate children’s perspectives into your pedagogy as you move forward in your studies, confronted with issues related to teaching and learning.

This course is neither a mathematics course, where the focus is fundamentally on your learning of mathematics, nor a mathematics methodology course, where the focus is fundamentally on your learning how to teach mathematics. Instead, this is a class about the issues that lie at the intersection of mathematics and children’s thinking. At times we will focus on mathematics and at other times we will focus on issues of teaching mathematics, but most of the time we will focus on issues related to children’s mathematical thinking and learning.

The goal of this course is not only to help you think more deeply about the mathematics you know (and will learn in the future), but to also support your thinking about the complexity, challenges, and opportunities open to those who take seriously the idea of teaching mathematics to children in a way that supports children’s developing rich mathematical understanding.
School Visitation
For two of our class sessions (3 and 6) we will meet on-site at Hardy Elementary School to conduct our children’s interviews. Our class will end a little early on these days so you can return to campus if you have to attend a subsequent class. Details about the school visit will outlined during session 2. Because of the location and parking issues, try to park on SDSU campus (Parking Lot 5) and walk to the school. Again, this will be discussed in class.

Professionalism during School Visits: When you are working with the children at the school, you will be in a professional role, so it is important that you dress and act accordingly. Please do not chew gum and be sure to silence your cell phone when you are at the school sites. In addition, you must refrain from eating and drinking at school (water bottles are fine.)

Interview Write-Ups: You will be responsible for conducting and audio-recording 2 interviews and writing a short analysis of the experience. The directions for conducting the interviews as well as the questions you are to pose are in the Week 1 documents section on BlackBoard. You will complete these two interview assignments with a partner.

Hardy Elementary School
5420 Montezuma Road, San Diego, CA 92115
Class Expectations
Instruction in this class is not designed for you to quietly and passively absorb information. It is also not intended to consist of multiple one-on-one conversations where you probe the teacher for clarity or correct answers and wait for the response. While instructor’s comments and explanations can guide the class and aid you in your understanding, true learning requires you to actively engage the material, reflecting on and examining problems presented. As such, class will primarily consist of group discussions of varying size where you will be asked to listen and respond to your classmates. Being a participant in such an educational community comes with many responsibilities.

1) Participate and contribute to class. Your participation in our class activities and discussions is important not only for your own learning, but also for the learning of others. Sharing your ideas and questions with the group as well as responding to those of your classmates is vital to our work together. You will find that you will learn a considerable amount through articulating your own thoughts to your classmates as well as being exposed to the ideas of your peers.

2) Respect and engage with others’ ideas. Being a good participant does not simply mean expressing yours ideas. Participation requires critical listening and thoughtful responses to the ideas of your classmates. This also means that conversations need to be limited to the material being covered. Please refrain from chatting during class. Even if comments are subject related, they inevitably disturb others and cause you to miss out on other important ideas. If you do have a question, please ask it to the whole class; it is possible that someone else has the same question.

3) Attend every class. If circumstances prevent you from attending class, please contact the instructor in advance. Attendance is critical in this class given that we meet only 7 times and much of our learning will take place during class discussions. Absences may be excused and will be evaluated on a case-by-case basis. Make-up assignments will generally be required and it is your responsibility to contact me for make-up work. Note that it is particularly important for you to attend the class sessions in which we interview children. If you are absent for these sessions, part of your make-up work will include finding a child to interview outside of class time.

4) Arrive on time for a prompt start. This class starts at 8:00 a.m. If you are unable to make it to a class on time, drop the course and enroll in another course. Because our class is based upon interactions, if you are tardy or you have to leave early, you will not be present for class discussions or activities. As mentioned above, this hurts the class, because we will not benefit from your wisdom, and it hurts you, because you will miss our discussions.

In the event you are tardy, please leave me a written note during the class session with your name and an explanation as to why you arrived late. This note not only communicates to me your situation, but also serves to correct my attendance, as you will have most likely already been marked absent. If you are tardy more than once, please come and talk to me personally,
so that I can understand the circumstances in your life that affect your ability to get to class on time. Multiple instances of being tardy will lower your overall grade.

5) **Complete all readings and homework assignments before class.** Each week you will have a variety of written tasks to complete individually. Every week the homework assignment and related documents will be posted on the Blackboard site (https://blackboard.sdsu.edu/). You are responsible for accessing these materials. These tasks will involve reading articles, watching and reflecting on video clips from the CD, and solving mathematics problems. These assignments must be turned in through TurnItIn on BlackBoard prior to the next class period. **One assignment will be accepted up to 1 week after the assignment is due with a 10% penalty unless there are extenuating circumstances. Please contact me as soon as possible to explain these circumstances if they do come up.** Note that a second late assignment will not be accepted.

6) **Cell Phones and Laptops.** The use of cell phones will be prohibited during class time. To be clear, this means that you are expected to not simply silence your phones, but turn them off completely. While you might think it is unreasonable, even dangerous to be off the digital grid for so long, such a request is necessary in order to build a community of learners. You will receive a 15-minute break each class during which you can check email, text, and make phone calls. If you are expecting an important call from someone, please let me know ahead of class and you may excuse yourself to the hallway to take it. As for computer use, obviously you may use your laptop for class use, but checking email, surfing the net, or working on other assignments will not be tolerated.

7) **Food and Drink.** Eating and drinking are permitted in class, but please do it in such a way that your consumption does not draw attention from the rest of class.

As a final comment, I do recognize that unforeseen events arise in our lives, and if this happens to you this semester, please contact me and we will have a conversation about possibilities.
Grading
Unlike a mathematics course, in which your grade is based upon your ability to correctly solve mathematics problems, this course is about focusing upon children’s mathematical thinking, and your grade will be based upon your analysis and reflections of interviews, readings and various others tasks.

Your grade in this class will be based on 6 homework assignments and 2 interview write-ups as well as participation in class activities and discussions. A point system will be utilized and point values are specified with the description of each assignment. These assignments are specified at the end of the course packet. Each student should complete and submit his/her own work for each homework assignment. You may work with classmates, but all material turned in should be your own work. For the interview write-ups, each pair will produce a single analysis for each interview except for part D, as noted in the instructions.

Please head all assignments with your name and the title of the assignment (e.g., John Doe, MTHED 212 HW1) and staple all lose pages together.

My hope is that we all recognize that grades are designed to reflect what one knows and what one has learned, but they do so inadequately. All grading systems are subjective, even those that are based solely on objective tests. In general, I reserve the grade of A for students whose work indicates they are grappling with the important ideas and reasoning deeply. If you complete an assignment thoroughly and on time, you will earn a grade of B. If your responses indicate that you have taken the extra time to think carefully about what you are writing, then you will earn an A.

Each assignment will be scored on a point system. For example, Assignment 1 is worth 21 points. If you adequately complete all parts asked of you, you will receive full marks. In addition, each assignment will be assessed another 6 points based upon how reflective you were as described below.

- 0 points: None or minimal reflection
  *No indication that you are grappling with deeper ideas or drawing connections among ideas.*

- 2 points: Adequate reflection
  *You are attempting to think about underlying ideas, but generally do so in a cursory manner.*

- 4 points: Good reflection
  *Your reflection is thoughtful and consistent.*

- 6 points: Beyond what is expected
  *You indicate consistently drawing connections and grappling with deeper ideas.*

**Note1:** Please do not ask me why you did not earn 6 points. Instead, you must be prepared to show me why your responses are above and beyond a “good” reflection.
Examples of writing and reflection scores of 3-6:

Suppose you write the following statement:
I’m going to give the child a join-result-unknown problem because it will help me understand how the child thinks.
- This is a claim that refers to a topic from class. If it is not followed with some supporting evidence, the writing warrants a 3.

Follow up with something like:
Doing so will help me because we have learned that children tend to follow a learning trajectory of strategies.
- This shows some evidence from the readings or in-class, which now warrants a 4.

Even better, add a sentence like:
Children generally begin using direct modeling to follow the action of a problem, after which they tend to learn counting strategies, and finally they learn to use number facts.
- This sentence offers more detailed evidence from the readings and class and now you have a nice claim followed by some solid evidence. This kind of writing warrants a 5.

Finally, to earn a 6 add something like the following:
Consider the problem, Joey had 8 gummy bears. His mother gave him 5 more gummy bears. How many does Joey now have? A child using a direct modeling strategy might count out a pile of 8 cubes and one of 5 cubes, then combine them and count the new pile of 13 cubes. A counting strategy might be to start at 8 and count onto by 5--9, 10, 11, 12, 13. Finally, a child might employ a number fact like the answer is 13 because 8 and 2 is 10 and 3 more makes 13.
- This is a detailed example from class and the readings that further supports your claim. Now you are at a 6.

Note: I expect you to submit typed, professional work. If your work does not have evidence of proper editing, you will lose reflection points, regardless how thoughtful your reflections are.

<table>
<thead>
<tr>
<th>Assignments</th>
<th>% of Grade</th>
<th>Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation in class discussions and activities</td>
<td>10%</td>
<td>Weekly</td>
</tr>
<tr>
<td>Homework</td>
<td>50%</td>
<td>Weekly</td>
</tr>
<tr>
<td>Interview #1 write-up</td>
<td>20%</td>
<td>Feb 17</td>
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<tr>
<td>Interview #2 write-up</td>
<td>20%</td>
<td>Mar 10</td>
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Final Grades:
- 90% – 100% A   60% - 70% D
- 80% – 90% B   Below 60% F (no credit)
- 70% – 80% C
**Policy on Cheating and Plagiarism:** Cheating is the actual or attempted practice of fraudulent or deceptive acts for the intention of gaining an unearned academic advantage; such acts also include assisting another student to do so. Plagiarism is a specific form of cheating which consists of the misuse of the published and/or unpublished works of others by misrepresenting the material (i.e., their intellectual property) so used as one’s own work. Penalties for cheating and plagiarism range from a 0 or F on a particular assignment, through an F for the course, to expulsion from the University. For more information on the University’s policy regarding cheating and plagiarism, refer to the Schedule of Courses (“Legal Notices on Cheating and Plagiarism”) or the University Catalog (“Policies and Regulations”). Academic dishonesty will not be tolerated, will result in a failing grade for this course, and will be reported to the University.

**Students with Disabilities:** If you are a student with a disability and believe you will need accommodations for this class, it is your responsibility to contact Student Disability Services at (619) 594-6473. To avoid any delay in the receipt of your accommodations, you should contact Student Disability Services as soon as possible. Please note that accommodations are not retroactive, and that I cannot provide accommodations based upon disability until I have received an accommodation letter from Student Disability Services. Your cooperation is appreciated.

**Religious Observances:** University Policy on Absence for Religious Observances includes the following statements: “By the end of the second week of classes, students should notify the instructors of affected courses of planned absences for religious observances. Instructors shall reasonably accommodate students who notify them in advance of planned absences for religious observances.” Please notify me in a timely manner and a reasonable accommodation will be reached.

**Syllabus is Subject to Change:** This syllabus and schedule are subject to change in the event of extenuating circumstances. If you are absent from class, it is your responsibility to check on announcements made while you were absent.
## COURSE PLAN

<table>
<thead>
<tr>
<th>Session</th>
<th>Location</th>
<th>Topic</th>
<th>Assignments Due</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>SDSU</td>
<td>Course Introduction</td>
<td>None</td>
</tr>
<tr>
<td>2</td>
<td>SDSU</td>
<td>• Exploring Children’s Thinking with Addition and Subtraction</td>
<td>Homework #1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Interview Preparation</td>
<td></td>
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<tr>
<td>3</td>
<td>Hardy Elem.</td>
<td>Interview #1</td>
<td>Homework #2</td>
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<tr>
<td>4</td>
<td>SDSU</td>
<td>Place Value and Algorithms</td>
<td>Homework #3</td>
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<td></td>
<td></td>
<td>Write-Up-Interview #1</td>
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<tr>
<td>5</td>
<td>SDSU</td>
<td>Fractions</td>
<td>Homework #4</td>
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<tr>
<td>6</td>
<td>Hardy Elem.</td>
<td>Interview #2</td>
<td>Homework #5</td>
</tr>
<tr>
<td>7</td>
<td>SDSU</td>
<td>Fractions and Integers</td>
<td>Homework #6</td>
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<td></td>
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<td>Write-Up-Interview #2</td>
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### Course Readings (supplemental readings may be added)


