Mathematics for Elementary Teachers
MSEd 414
Northwestern University
Summer 2020
Tuesdays and Thursdays, 12:30 – 3:00 pm

Sarah Larison
Graduate Student, Learning Sciences
slarison@u.northwestern.edu
Office hours by appointment

Course Objectives

MSEd 414 is designed to support future teachers of elementary mathematics develop understanding of learners of mathematics as sensemakers, conceptual understanding of the mathematics you will teach, and explore the ways that mathematical ideas are interconnected and develop across time. In each session of this course, we will engage in mathematics together, analyze our own and one another's thinking, and examine the ways that students think about related concepts.

In this course, future teachers will:

- Come to see yourself, others, and children as mathematical sensemakers.
- Develop conceptual understanding of the mathematics content in elementary and middle grades.
- Develop understanding of the ways that children make sense of mathematics concepts across time and see this sensemaking as reasoned, developmental, and at the heart of our work as teachers.
- Examine how the tasks we engage children in constrain or enable sensemaking.
- Conceive of mathematics as system of interconnected ideas and practices that can be used flexibly and creatively to understand our world.

Northwestern Teacher Education Conceptual Framework

The Teacher Education Program at Northwestern University is guided by a conceptual framework for teacher education, organized around a vision of learning, learners and teaching. The conceptual framework focuses on

A vision of learning that includes:

- how students come to understand and think about subject matter;
- an emphasis on inquiry and reflection;
- the importance of collaboration and social interaction; and
- experiential activities that are relevant and engaging.

A vision of learners that includes:

- the belief that every person is capable of learning;
- that development is shaped by social contexts; and
- equitable experiences for all.

A vision of teaching that includes:

- connecting theory and practice;
- inquiry, reflection, collaboration, and innovation;
- creating a climate of learning for all students; and
- acting professionally, responsibly, and ethically.

Dispositions
CAEP defines dispositions as "habits of professional action and moral commitment to teaching." The Northwestern teacher preparation programs will help candidates acquire the following dispositions to the level of proficiency:

- to reflect on one's own practice and make changes as appropriate.
- to support students as individuals.
- to collaborate with all stakeholders.
- to engage all students.
- to incorporate innovations in teaching, including the use of new technologies.
- to conduct one's self professionally, responsibly, and ethically.

ILLINOIS PROFESSIONAL TEACHING STANDARDS (2013)

Standard 1 - Teaching Diverse Students – The competent teacher understands the diverse characteristics and abilities of each student and how individuals develop and learn within the context of their social, economic, cultural, linguistic, and academic experiences. The teacher uses these experiences to create instructional opportunities that maximize student learning.

Standard 2 - Content Area and Pedagogical Knowledge – The competent teacher has in-depth understanding of content area knowledge that includes central concepts, methods of inquiry, structures of the disciplines, and content area literacy. The teacher creates meaningful learning experiences for each student based upon interactions among content area and pedagogical knowledge, and evidence-based practice.

Standard 3 - Planning for Differentiated Instruction – The competent teacher plans and designs instruction based on content area knowledge, diverse student characteristics, student performance data, curriculum goals, and the community context. The teacher plans for ongoing student growth and achievement.

Standard 4 - Learning Environment – The competent teacher structures a safe and healthy learning environment that facilitates cultural and linguistic responsiveness, emotional well-being, self-efficacy, positive social interaction, mutual respect, active engagement, academic risk-taking, self-motivation, and personal goal-setting.

Standard 5 - Instructional Delivery – The competent teacher differentiates instruction by using a variety of strategies that support critical and creative thinking, problem-solving, and continuous growth and learning. This teacher understands that the classroom is a dynamic environment requiring ongoing modification of instruction to enhance learning for each student.

Standard 6 - Reading, Writing, and Oral Communication – The competent teacher has foundational knowledge of reading, writing, and oral communication within the content area and recognizes and addresses student reading, writing, and oral communication needs to facilitate the acquisition of content knowledge.

Standard 7 - Assessment – The competent teacher understands and uses appropriate formative and summative assessments for determining student needs, monitoring student progress, measuring student growth, and evaluating student outcomes. The teacher makes decisions driven by data about curricular and instructional effectiveness and adjusts practices to meet the needs of each student.

Standard 8 - Collaborative Relationships – The competent teacher builds and maintains collaborative relationships to foster cognitive, linguistic, physical, and social and emotional development. This teacher works as a team member with professional colleagues, students, parents or guardians, and community members.

Standard 9 - Professionalism, Leadership, and Advocacy – The competent teacher is an ethical and reflective practitioner who exhibits professionalism; provides leadership in the learning community; and advocates for students, parents or guardians, and the profession.

Standards Addressed

MSEd 414 will address a wide range of the Illinois Professional Teaching Standards, primarily focused on the following: 1B, 1C, 1F, 1G, 2A, 2B, 2C, 2D, 2E, 2F, 2G, 4B, 4D, 6G, 7B, 7E, 7J.

Course Materials

Required Text:

Small, M. (2019). *Understanding the Math We Teach and How to Teach It: K-8*. Portland, ME: Stenhouse.

Required Materials:

During the summer of 2021, this course will meet virtually. Each enrolled student will be provided with a manipulative kit, mailed to you by the MSEd office, for use in class each time we meet. In addition, you will need materials for completing mathematical work, such as blank paper, pencils, and colors (colored pencils, markers, or pens).

Working Together

Because this course will meet virtually, we will make use of Google Drive to collaborate on documents, do activities, and share our work. You can access this folder to add your work, contribute to shared thinking, and download our collective work at:
https://drive.google.com/drive/folders/1uDNlpxHzxJ-EpIIZsefmXGLvQXGsnCzl?usp=sharing

Course Assignments

Assignment	Due Date
Math Story Reflect on your past and present experiences as a math learner and how these experiences impact your identity and beliefs as a math learner and teacher. Details provided in our first class.	Session 2: June 24th
Math Journal For each class session, beginning with the second session, you will be asked to use what we experienced and read in the previous class to complete a brief set of mathematical tasks. Your work should be fully represented using objects, drawings, numbers, symbols, and/or words so that others could follow your reasoning. It should draw on the kinds of invented, developmental strategies that students in elementary and middle school might use. Creativity is encouraged! In some weeks, your journals will include constructing concept maps of the mathematical ideas in that week's readings. The map should aim to capture mathematical concepts, strategies, misconceptions, and any other idea that struck you an important, and how all of these are related.	Each session, Session 2 (June 24) – Session 11 (July 27) *10 Math Journal Entries*
Photo Journal Across the course, take and/or collect photographs of examples of mathematics in the world and assemble at least 6 photos into a photo journal. Each photo should	Session 12: July 29 *Presentations to*

occupy a single slide and then be annotated to show what you notice mathematically, what the image makes you wonder mathematically, and the mathematical connections you see (including to our reading and class activities). In one session during the quarter, you will present one of these images, first without the annotations and then with them, to engage the class in a discussion.	*occur throughout the quarter*
Analysis of Student Thinking In Week 5, you will be presented with a set of student work from which to choose one sample to analyze deeply. First, annotate the work sample to show what you notice and what you wonder about the student's thinking. Then, write a brief analytic paper (400 – 600 words) that addresses what you believe the work demonstrates the student understands and does not yet understand, using our readings to support your claims. Suggest 1-2 additional tasks you would be interested to see the student try, and describe what these tasks would allow you to learn about the student and what they would allow the student to learn about mathematics.	Session 12: July 30
Final Reflection Reflect on your math story, your experiences in this class, and your hopes and plans for your future math learning and teaching.	Session 12: July 30
Participation Our whole class learning is enhanced when everyone reads carefully and fully participates in class activities and discussions. It is an expectation that you attend every class, come prepared, and share your thinking.	Every week

Submitting Assignments

All assignments are due at the beginning of class and should be submitted through Canvas. Concept map slides (when part of Math Journals) and Photo Journal slides to present must also be uploaded to the course Google Drive folder: https://drive.google.com/drive/folders/1uDNlpxHzxJ-EpIIZsefmXGLvQXGsnCzl?usp=sharing

Grades

Class participation and completion of all assignments are critical to your preparation to teach. This includes coming to class having read and/or completed tasks on time. Your course grade will be based on the quality of the following:

Participation in and preparation for class	20%
Math Journal	50%
Photo Journal	10%
Analysis of Student Thinking	10%
Math Story & Final Reflection	10%

Attendance

Students are expected to attend all class sessions for the full class time. This class is designed based on the principle that learning is socially constructed. As such active participation, discourse, and engagement in class is critical for your learning and being prepared to teach mathematics in your own classroom. This class, in the summer of 2021, will meet virtually during the allotted time. Unless technological constraints prohibit it, students are expected to have their video on during class meetings so we can better interact with one another's thinking. If you must be absent from all or a portion of class, you are expected to contact Sarah in advance to make arrangements. Missing more than one class may necessitate an "Incomplete" in the course.

Academic Integrity

Students in this course are required to comply with the policies found in the booklet, "Academic Integrity at Northwestern University: A Basic guide". All papers submitted for credit in this course must be submitted electronically unless otherwise instructed by the professor. Your written work may be tested for plagiarized content. For details regarding academic integrity at Northwestern or to download the guide, visit: http://www.northwestern.edu/provost/policies/academic-integrity/index.html.

Accommodations for Students with Disabilities

Any student with a disability requesting accommodations must register with Services for Students with Disabilities (ssd@northwestern.edu; 847-467-5530) and request an SSD accommodation notification for their professor, preferably within the first two weeks of class. All information will remain confidential.

Supports in Distress

Students can find useful resources for safety and security, academic support, and mental and physical health and well-being at the NUhelp **website** and **app**.

Week-by-Week Foci

	Date	Focus	Readings	Assignments Due
Week 1	Session 1: June 22	What is math? How does it mean to do math? How we will do math together in this course	Chapter 1: How Student Learn Math and What Math We Want Them to Learn Chapter 2: Focusing Instruction on Big Ideas and Mathematical Processes	None
	Session 2: June 24	Counting and Developing Understanding of Operations	Chapter 5: Early Number Chapter 6: Early Operations	**Math Story** **Math Journal #1**
Week 2	Session 3: June 29	Place Value and Operations	Chapter 9: Estimation and Calculation Strategies with Larger Whole Numbers	**Math Journal #2**
	Session 4: July 1	Estimation	None	**Math Journal #3**
Week 3	Session 5: July 6	Fractions	Chapter 10: Fractions	**Math Journal #4**
	Session 6: July 8	Fractions and Operations	None	**Math Journal #5**
Week 4	Session 7: July 13	Proportional Reasoning, Patterning, and Algebraic Thinking	Chapter 12: Ratio and Proportion Chapter 14: Patterns and Algebra	**Math Journal #6**
	Session 8: July 15	Proportional Reasoning, Patterning, and Algebraic Thinking	None	**Math Journal #7**
Week 5	Session 9: July 20	Geometry: Shapes and Space	Chapter 15: 3-D and 2-D Shapes Chapter 16: Location and Movement	**Math Journal #8**
	Session 10: July 22	Measurement and Geometric Measurement	Chapter 17: The Nature of Measurement, with a Focus on Length and Area Chapter 18: Volume (only, pages 477-491)	**Math Journal #9**

Week 6	Session 11: July 27	Data	Chapter 19: Data	**Math Journal #10**
	Session 12: July 29	Data What is math? What does it mean to do math?	None	**Photo Journal** **Analysis of Student Thinking** **Final Reflection**

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