

Constructing Number Sense

Fall 2016

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Essex Town School District Math Coach

Dates: Saturdays Oct. 8 and Nov. 19 (9-4)
Wednesdays Sept. 21, Oct. 19, Oct. 26, Nov. 30, Dec. 7 (4-8)
One online session (4 hours)

Course Description

This course will examine research on how students develop a deep understanding of number and mathematical thinking. Participants will look at both the learning progressions and the standards progression from concept of number to additive reasoning and fact fluency in the Vermont Common Core State Standards. They will explore instructional and assessment strategies and will analyze student work to identify where students are on a learning progression and plan next instructional steps. Participants will collaborate with other teachers to strengthen and/or develop their numeracy units, including formative assessments and instructional strategies and lessons, with integrated technology. The class will deepen their own content knowledge by interacting with materials, research based readings, and class discussions.

Goals

- Examine the CCSS, the Mathematical Practices and the accompanying learning progressions.
- Understand the big ideas and how they progress and build across grade levels.
- Become knowledgeable about how students develop additive and algebraic reasoning.
- Use formative assessments as an instructional tool to identify student misconceptions and inform decisions for next instructional steps.
- Identify gaps in participant's current program and research lessons to address those needs.
- Collaborate with colleagues to deepen content and pedagogy and build a supportive community of adult learners.
- Integrate technology to deepen numeracy and additive reasoning.

Learning Outcomes

- Participants will deepen their own content knowledge of numeracy and additive and algebraic reasoning.
- Participants will know and understand the applicable content and the learning progressions of the CCSS across grade levels.
- Participants will know the cognitive research about how children construct number sense, addition, and subtraction concepts and fact fluency.

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- Participants will learn how to identify where students are on a learning progression by analyzing student work.
- Participants will develop a variety of instructional strategies to promote student learning including formative assessments as an instructional strategy.
- Participants will explore technology applications and games during the course to incorporate them in their instruction.

Course Outline

Session	Topic	Reading Assignments
1	What is Number Sense? What is Additive Reasoning	“ K, Counting and Cardinality; K–5, Operations and Algebraic Thinking” Learning Progression, pages 1-21, K-2
2	Addition and Subtraction: Big Ideas and Essential Understandings	<u>Developing Essential Understanding of Addition and Subtraction PreK-Grade 2</u> , Chapter 1, pages 7-27
3	The Role of Visualization	“Seeing as Understanding: The Importance of Visual Mathematics for our Brain and Learning” ,Jo Boaler
4	Developing Mathematical Models Representing Situations with Addition and Subtraction The Meaning of the Equal Sign	<u>Developing Essential Understanding of Number and Numeration, PreK-Grade 2</u> Chapter OR <u>Developing Essential Understanding of Addition and Subtraction PreK-Grade 2</u> , Chapter 2, pages 50-54, 65-67
5	Strategies for Addition and Subtraction Facts The Role of Games	<u>Number Talks</u> , Sections I and II
6	Role of Place Value and Properties for Addition and Subtraction Computation	<u>Young Mathematicians at Work</u> , Chapters 4, 7 and 8 <u>Developing Essential Understanding of Addition and Subtraction</u> , Chapter 1, pages 28-48
7	Project Presentations	
8	Independent Assignment	TBD

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Course Requirements and Grading

Course Requirement	Evidence of Meeting Expectations	Weight
Attendance & Participation	<ul style="list-style-type: none">● Attend all session● Participate in class discussions● Collaborate with colleagues● Prepare and teach a lesson/game from text	20%
Reading and Reflections	<ul style="list-style-type: none">● Complete required readings● Write reflections for three readings● Complete online independent assignment	20%
Fact Fluency Assessment	<ul style="list-style-type: none">● Administer Fact Fluency Assessment● Analyze student responses by strategies	10 %
Project	<ul style="list-style-type: none">● Complete project● Present project	50%

Reading Assignments

- “ K, Counting and Cardinality; K–5, Operations and Algebraic Thinking Learning Progression”, pages 1-21, K-2 focus.
https://commoncoretools.files.wordpress.com/2011/05/ccss_progression_cc_0a_k5_2011_05_302.pdf
- NCTM: Developing Essential Understanding of Number and Numeration, PreK - Grade 2, 2010
- **OR**
- NCTM: Developing Essential Understanding of Addition and Subtraction PreK-Grade 2, 2011
- Parish, Sherry, Number Talks: Helping Children Build Mental Math and Computation Strategies, Grades K-5, Sections I and II, 2010 or 2014.
- Melissa Conklin and Stephanie Sheffield It Makes Sense! Building Number Sense with the Hundreds Chart K- 2, 2012
- **OR**
- Melissa Conklin, It Makes Sense! Using Ten-Frames to Build Number Sense, Grades K–2, 2012

Optional: Fosnot, Catherine, Dok, Marteen, Young Mathematicians at Work: Constructing Number Sense, Addition, and Subtraction, 2001

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Reading Reflections

- Identify 3 ideas that represent either a big idea, new idea to you, or connection to student learning for three of the reading assignments

Online Independent Assignment

- To be determined

Fact Fluency Assessment

- Administer Addition Fact Fluency Assessment
- Analyze student responses by strategies

Group or Individual Project

- Choose a math learning target from your curriculum
 - What students will understand and know and be able to do
- Identify the common core standards and mathematical standards of practice
- identify the research to support the work
- Organize/design a series of lessons to develop the learning target
 - include a technology connection
- Create the formative assessment(s) for evidence of learning
- Implement the lessons
- Organize your project in a binder or google doc to submit
- In your summary, discuss how your new learning will impact your teaching
- Present your project in our final meeting in September