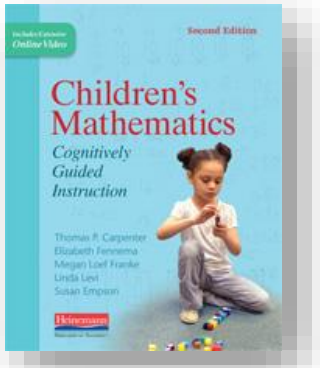
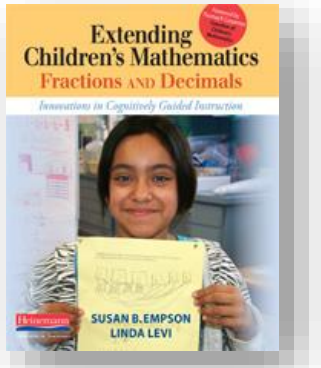
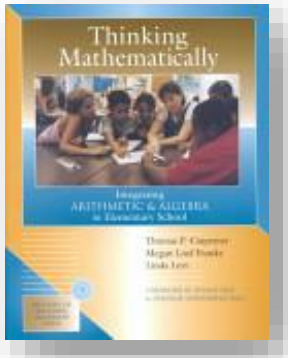
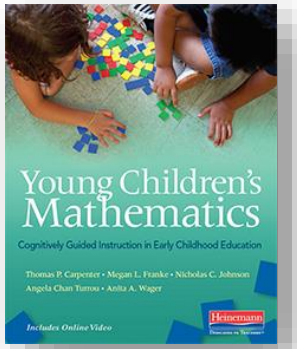








How children learn mathematics:

An introduction to Cognitively Guided Instruction

DA VINCI CONNECT PARENT EDUCATOR SPOTLIGHT

JANUARY 16, 2019

Good evening!

- Stand and find someone you don’t know or haven’t spoken with yet today
  - Share something enjoyable from your winter break
  - What (if anything) do you know about Cognitively Guided Instruction (CGI)?

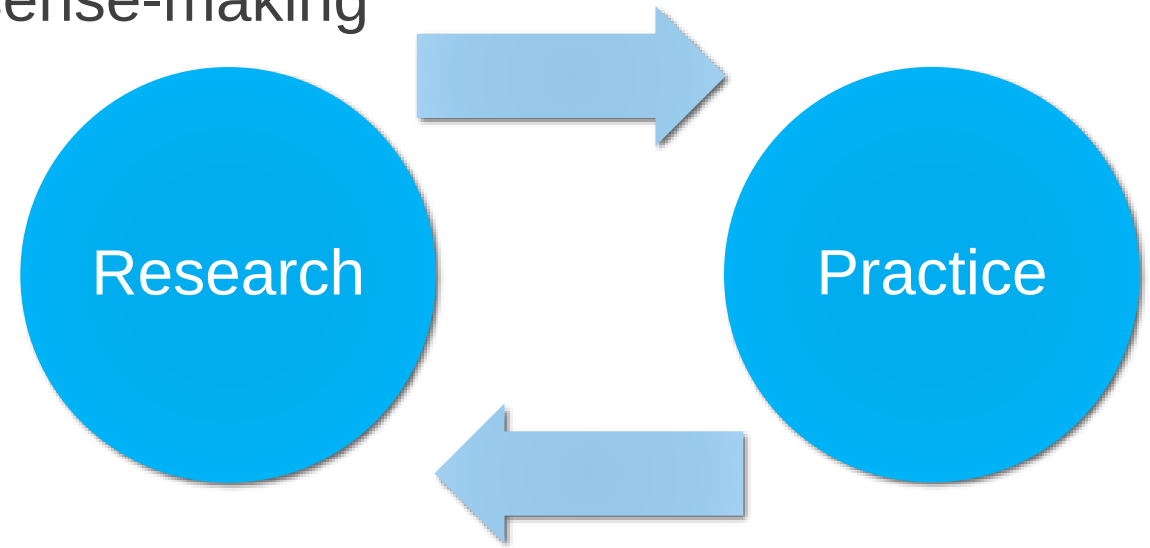
Tonight

- What is CGI?
- Children's thinking about addition and subtraction
- Counting Collections

What is CGI?

Cognitively Guided Instruction (CGI) is a research and professional development program that:

- focuses on how children think about mathematics and how their understanding develops
- explores ways teaching can center and build from children's natural ideas and sense-making



Aaliyah has 6 dandelions. How many more dandelions does she need to pick so that she has 11 dandelions altogether?

Isabella has 4 pencils. Natalie has 9 pencils. How many more pencils does Natalie have than Isabella?

Direct Modeling as a foundation for problem solving

- Children naturally attempt to solve problems by modeling the actions and relationships within story situations.

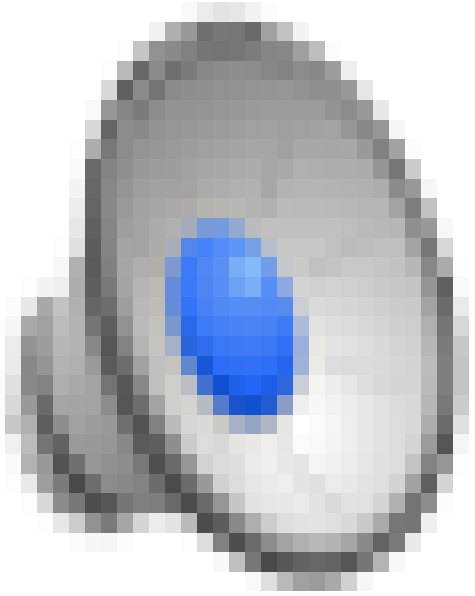
- Isabella has 4 pencils. How many more pencils does she need to collect to have 9 pencils altogether?

- Isabella has 9 pencils. She gave 4 pencils to her friend, Natalie. How many pencils does Isabella have now?

- Isabella has 4 pencils. Natalie has 9 pencils. How many more pencils does Natalie have than Isabella?

Camila has $7 and she wants to buy a book. How many more dollars does she have to earn so she can have so she can have $11 to buy this book?

I had 15 cookies and I ate 6 of them. How many cookies do I have left?

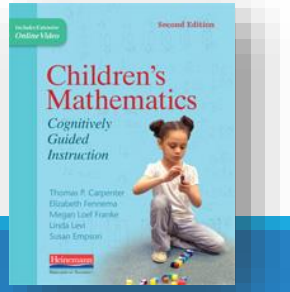


Karen

The Development of Children's Natural Strategies for Addition and Subtraction

- **Direct Modeling**
- **Counting**
- **Number Facts**
  - Derived Facts
  - Recall

*see *Children's Mathematics*, Ch. 3



“We neither provide a curriculum for teachers to follow nor specify explicit forms of teaching, grouping students, or interacting with them.”

(Carpenter & Franke, 2004)

Cognitively Guided Instruction
Principled Ideas

- **Guiding principle:**
  - Children bring knowledge of mathematics to problem solving situations; and the ways children think about solving problems often does not match adults'
- **Teaching approach:**
  - Provide opportunities to listen to and learn about your students' mathematical thinking
  - Notice what children CAN do; make instructional decisions that build on what they know
  - Create multiple ways to participate
- **Overarching goals:**
  - Support students to see themselves (and each other) as capable knowers and doers of mathematics
  - Develop "mathematically proficient" students

Common instructional activities

- Solving Story Problems
- Counting Collections
- Warm-Up Activities
  - Choral Counting
  - Mental Math
  - Which One Doesn't Belong?
  - How Many Ways
- True/False & Open Number Sentences

Goals:
To get students talking math, learn about their thinking, establish classroom communities where multiple ways of thinking are valued, build number sense, increase student participation, etc.

Counting Collections

Count your collection!

- With your partners, figure out how many items are in your collection.
- When you are finished counting, leave your collection on the table; don't clean up!
- If you and your partners finish early, you may help another group count their collection.

Counting Collections

- Gallery walk
  - What did you notice?
  - What learning opportunities are available within this task?
    - Mathematical opportunities
    - Social/collaborative opportunities

Counting Collections

Lakeisha has lined up paintbrushes across a table and is rolling them one by one to the side. Tyler and Auveen are wrapping pencils into bundles. Maya is organizing toy kangaroos, and her partner, Max, is drawing a picture of how she is doing it. What is going on in this classroom?

Why Count Collections?

At the beginning of every school year, the five- to seven-year-olds at Corinne A. Seeds University Elementary School (UES) spend several weeks "counting collections." UES, the laboratory school of the Graduate School of Education and Information Studies at UCLA, serves a socioeconomically and ethnically diverse student population from urban and suburban Los Angeles. The classes are multiage, and the five- to seven-year-old classes include children who would be considered kindergarten and first-grade students.

Our work in counting collections was inspired by Megan Franke, a parent at our school and a researcher in mathematics education and children's thinking who has often worked in our classrooms. Megan encouraged us to try counting collections of objects with our young children, believing this would provide children with rich opportunities to practice oral counting, develop efficient counting strategies, group objects in strategic ways, record numbers, and represent their thinking. Research shows that although counting is one of the best ways we know to help children develop number sense and other important mathematical ideas, we do not do nearly enough of it in elementary schools. Children need lots of experience with counting to learn which number comes next, how this number sequence is related to the objects in front of them, and how to keep track of which ones have been counted and which still need to be counted (Fuson 1988). Experience with counting provides a solid foundation for future experience with addition, subtraction, multiplication, and division (National Research Council 2001).

Convinced by the literature as well as the outcomes we have seen with our students, we have made counting collections a fundamental part of what we do with young children at UES beginning the first week of school each fall. We hope this article will provide a window on the process of counting collections in our classrooms as well as evidence that every child in our classrooms can build his or her mathematical skills by counting collections.

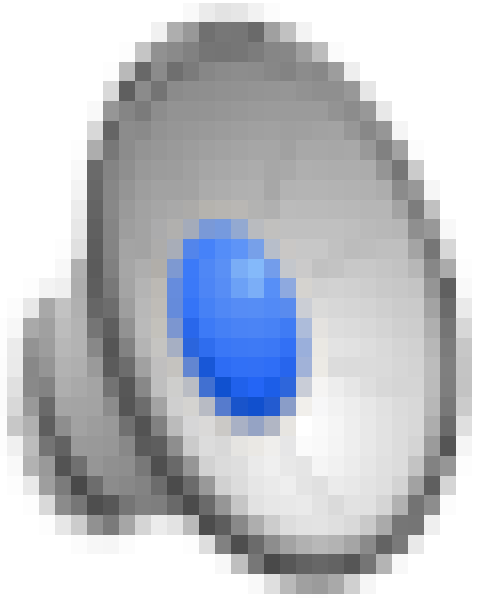
By Julie Kern Schwerdtfeger and Angela Chan

Julie Kern Schwerdtfeger, jks@ucla.edu, is a demonstration teacher at Corinne A. Seeds University Elementary School, University of California, Los Angeles. Angela Chan, achan@gseis.ucla.edu, is a graduate student in urban schooling in the Graduate School of Education and Information Studies, UCLA. They are staff developers with the Algebra Project, based at Center X, and instructors for Math Methods in the teacher education program, all at UCLA.

Identifying Collections and Beginning the Counting Process

At first, as the children are getting to know the classroom and we are getting to know them, we have them take an inventory of objects they find in the room, such as buckets of markers, pattern blocks, and Legos. We have also accumulated boxes of shells, keys, coins, bottle caps, and the

Mr. Jones had 26 comic books. His friend gave him 45 more comic books. How many comic books does Mr. Jones have now?



Ryan had 26 toy trucks. His friend gave him 45 more toy trucks. How many toy trucks does Ryan have now?

Charles had 60 rocks. He lost 27 of them. How many rocks does Charles have left?

Some big ideas about children's thinking…

- Children come to school with mathematical knowledge
- Children naturally attempt to solve problems by modeling the actions or relations within the story
- Children's understanding develops through well documented trajectories
- Children's strategies naturally build upon one another and become quite sophisticated
- Development of children's thinking often does not match the way adults solve problems

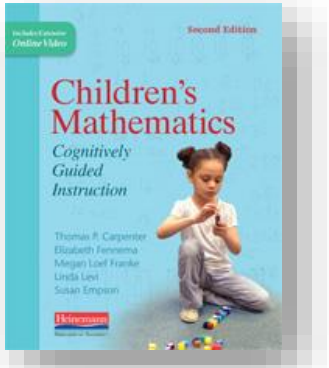
Next steps

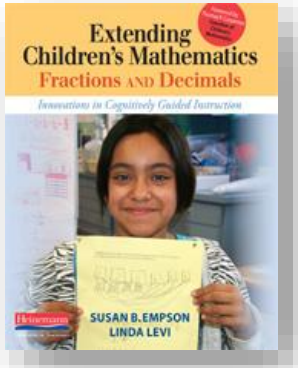
- Go back and try something with your child related to what we have worked on this evening
  - Addition/subtraction story problem
  - Count a collection

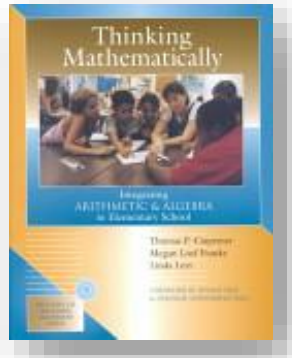
- Bring back specific evidence of what happened (one thing!)
  - Student work
  - Photo of their strategy
  - Video or audio recording

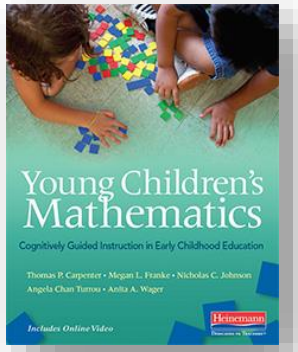
Learn more!

- CGI books & videos
- CGI Professional Development Institutes
- Twitter #CGImath









Thank you!

Nick Johnson & Theresa Leone


@CarrythZero

#CGImath #ChoralCounting #CountCollections