Unpacking Thinking in the Math Classroom

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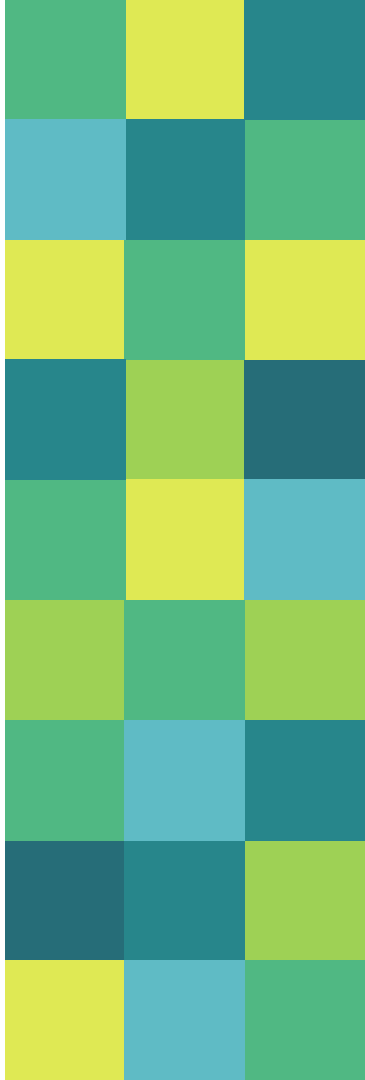
http://bit.ly/UnpackingThinking

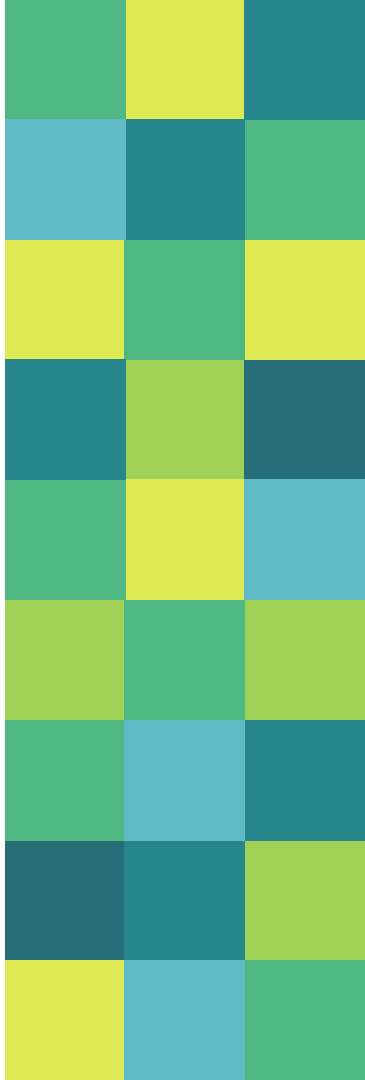
Welcome

- On the table, there are math activities.
- Complete a couple of activities with a partner or as a group
- Reflect on your thought process as you are solving the question(s)
- With your group, discuss what you were thinking



Our Journey

- EQAO data - challenges with thinking questions
- Make thinking visible
- Better insights into student thinking
- Alternative way to differentiate instruction
- Improve how we support our ESL / ISSP population
- Increase teacher efficacy



Professional Learning Goals

KNOW

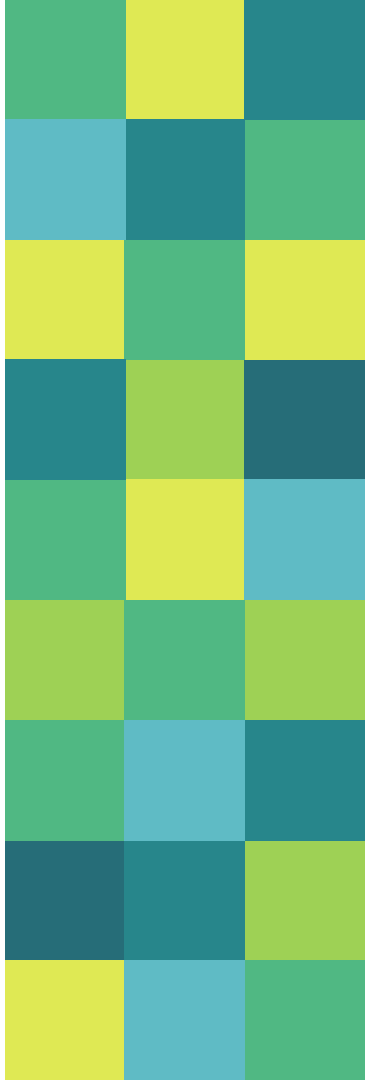
- Develop an understanding of thinking in the Math curriculum
- Explore and name the categories of thinking

DO

- Make connections between the activities and the categories of thinking

BE

- Reflective and responsive in planning intentional Math thinking tasks

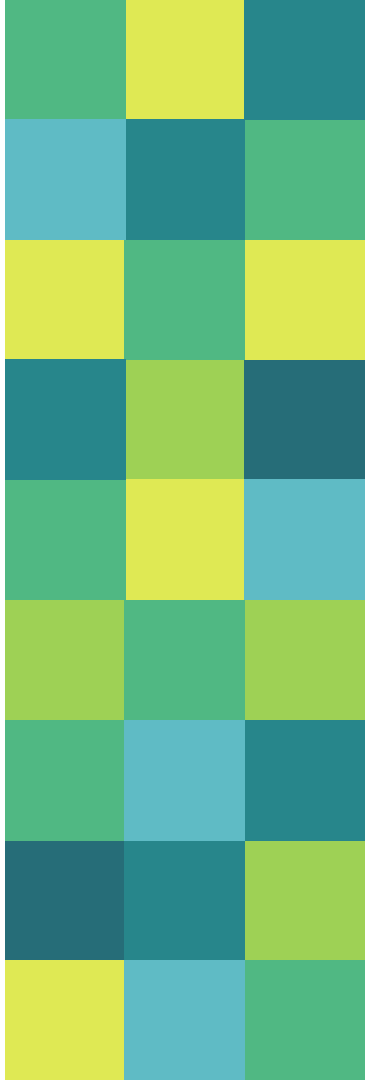


What is MATHEMATICAL THINKING?

Small: “mathematical practice and processes”

Fiore and Lebar: “make sense of mathematics (by reasoning, proving, connecting, reflecting and justifying), use mathematical skills effectively (by using mathematical conventions and vocabulary), thoughtfully communicate mathematically thinking and critically interpret mathematical knowledge and skills (by considering multiple mathematical perspectives).”

Ball: “changing, varying, reversing, altering, generalizing, conjecturing, explaining, justifying, verifying, convincing and refuting”



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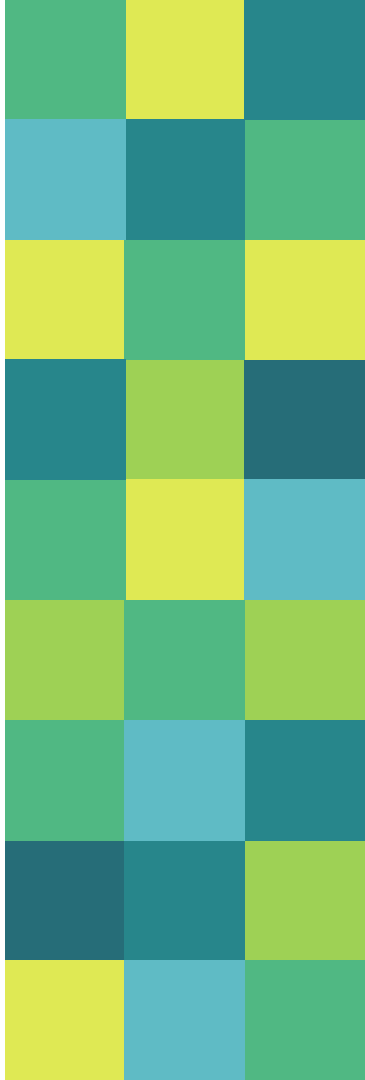
OUR DEFINITION: “Interacting with numbers”



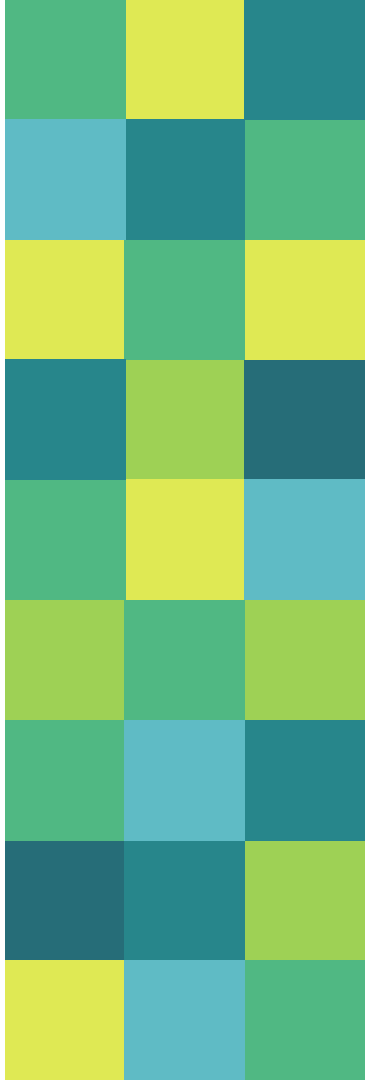
Resources

Mathematics Curriculum

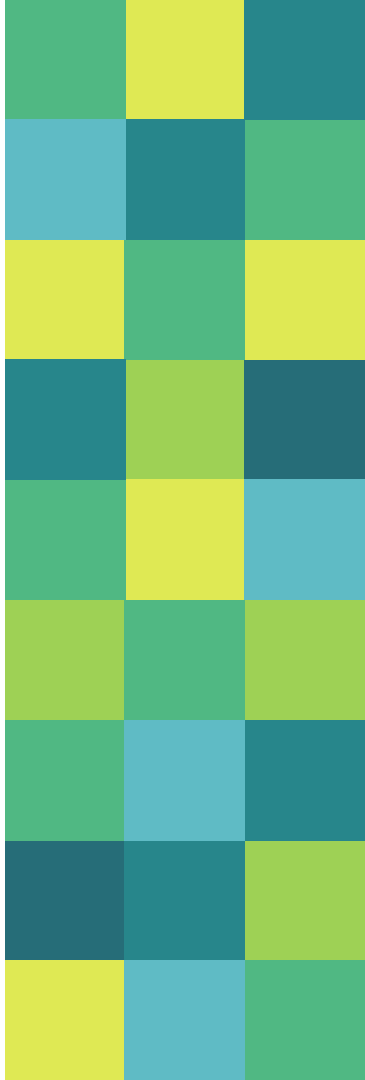
TC2 Thinking Competencies

Teaching Math with Meaning by Cathy Marks Krpan

Moving Math by Mary Fiore and Maria Luisa Lebar



Where is thinking in the Mathematics curriculum?



Categories of Thinking

Procedural

Conceptual

Representative

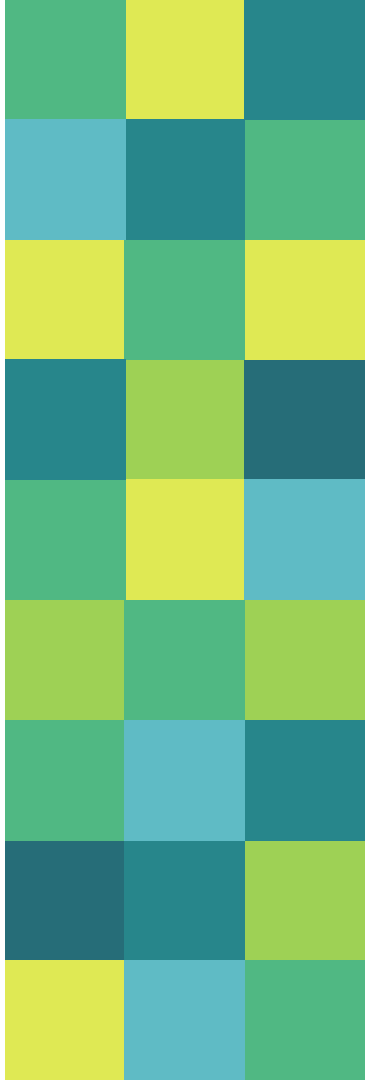
Structural

Communicative

Connective

Constraint

http://bit.ly/ThinkingCategories



Naming Thinking

Reflecting on the activity in the beginning, name the thinking based on the categories:

Procedural

Conceptual

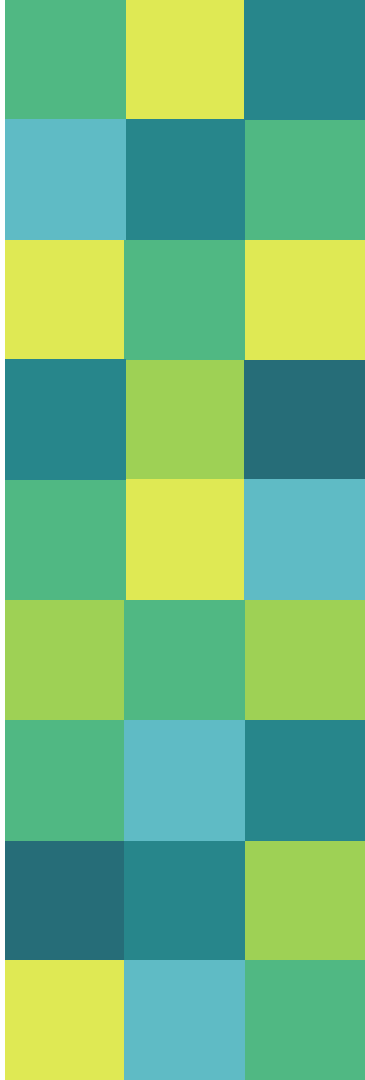
Representative

Structural

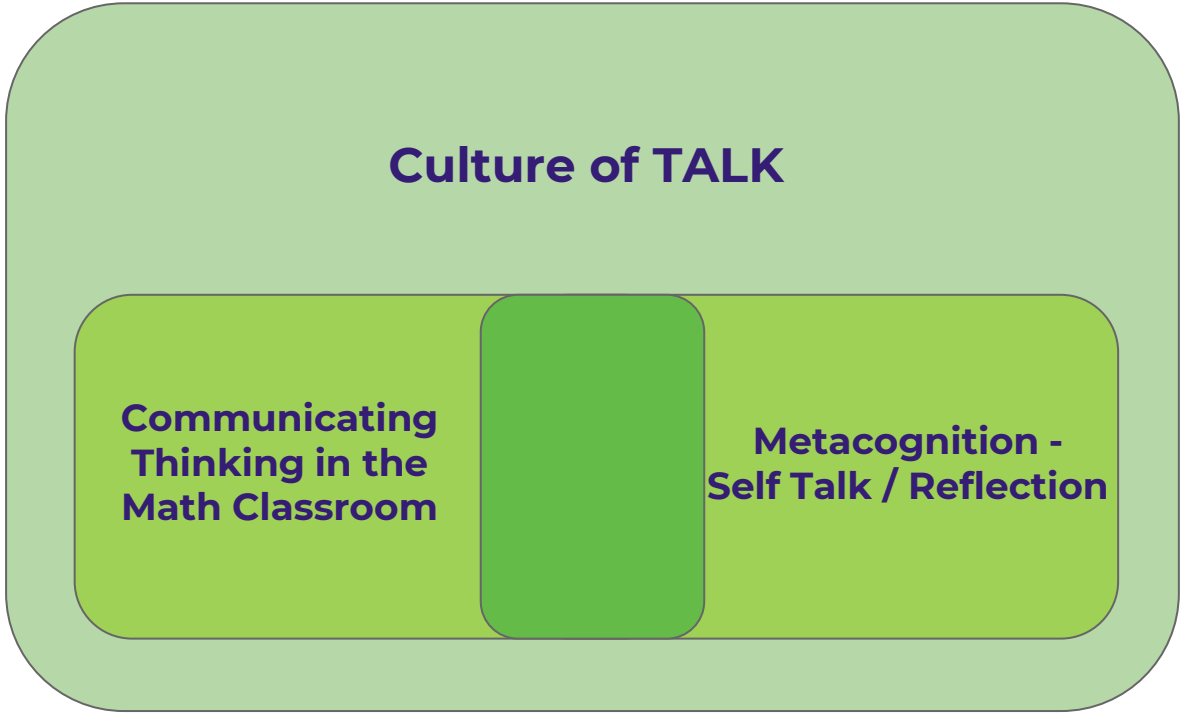
Communicative

Connective

Constraint



Vision for Promoting Mathematical Thinking



Vision for Promoting Mathematical Thinking

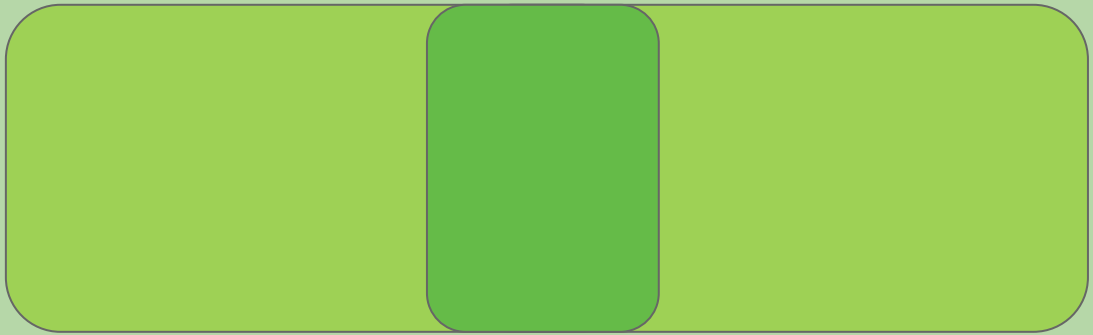
Culture of TALK

Learning Culture

- Creating a safe space
- Protocols for listening and sharing
- Opportunity to hear others' thinking
- Grouping students

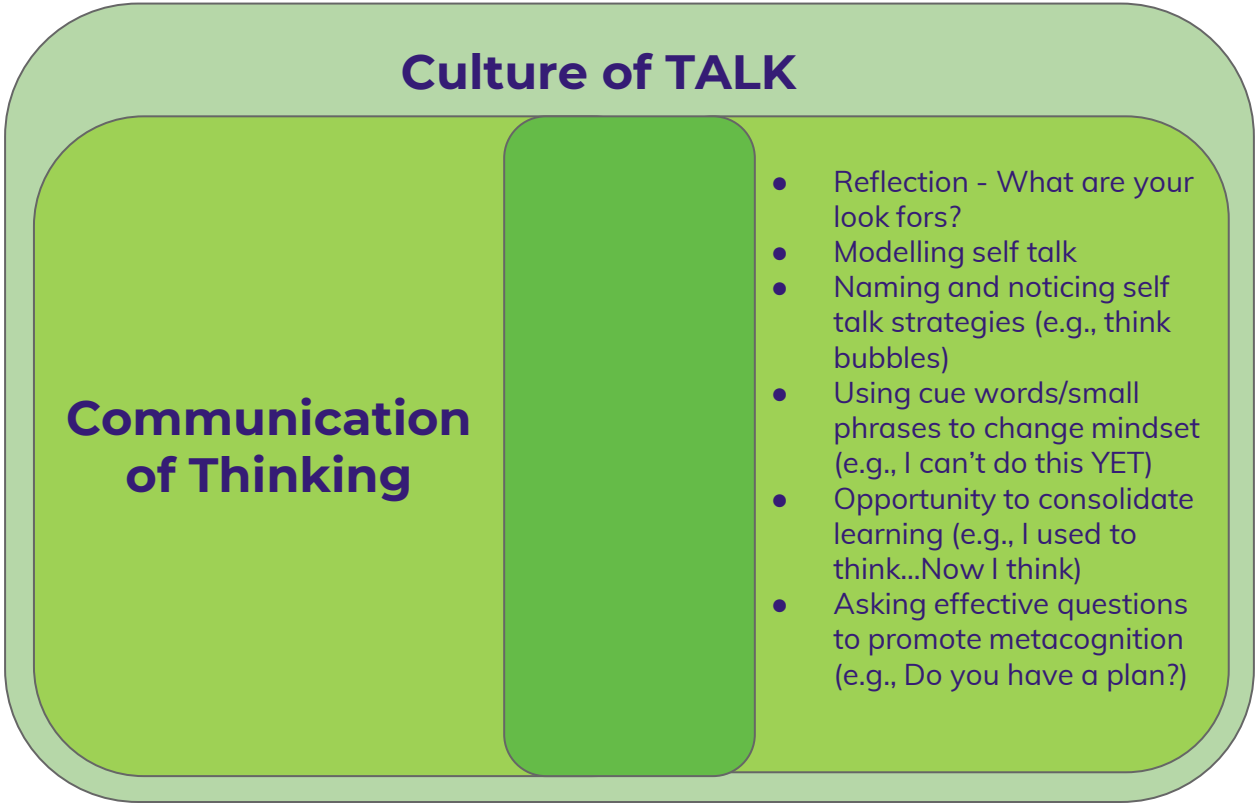
Instructional Strategies

- Paraphrasing / Convincing a friend
- Number / Fraction Talks / WODB
- Turn and Talk
- Talking prompts (What I hear you say is..)
- Wait Time
- Mathematical Think-Alouds
- Mathematical Arguments
- Rich problems that encourage discussion



Communicating Thinking

Metacognition - Self Talk Strategies



Supporting Your Math Thinking Journey

Thinking and Questions - General - http://bit.ly/ThinkingandQuestions

Thinking and Questions Planning - Grade 3 - http://bit.ly/ThinkingandQuestionsGr3

Thinking and Questions Planning - Grade 7 - http://bit.ly/ThinkingandQuestionsGr7

Thinking and Questions Planning Template - http://bit.ly/ThinkingandQuestionsBlank

Questions