

Using Discourse Strategies to Promote Student Voice, Agency and Mathematical Thinking

National Council of Teachers of Mathematics Annual Conference

April 6, 2019 - 9:45 AM - 11:00 AM

Hilton Bayfront, Indigo A - San Diego, CA

Facilitators

- Bisola Neil, The Urban Assembly, New York
 - bneil@urbanassembly.org
- Elizabeth Flegar, Naugatuck School District, Connecticut
 - elizabeth.flegar@naugatuck.k12.ct.us

Objectives:

Use a workshop model to:

- Examine how language and discourse create (in)equitable spaces for students
- Become familiar with six of the ten 'Discourse Strategies' (DS) through the lens of access and equity
- Determine how DS build student mathematical identity and sense of belonging in the math class
- Practice embedding the DS into rich tasks

Key Definitions:

DISCOURSE STRATEGIES

Discourse Strategies are intentional teacher moves designed to promote equitable mathematical instructional practices.

They promote student-centered classrooms by giving students daily opportunities to experience rich mathematics by creating viable mathematical arguments, critiquing the reasoning of others and reasoning abstractly and quantitatively.

DISCOURSE STRATEGIES FRAMEWORK

The 'Discourse Strategies Framework' structures HOW, WHEN and WITH WHOM teachers decide to use chosen strategies to meet the needs of all learners.

It supports teachers in making equity-based decisions throughout the planning, implementation and reflection process.

RECEPTIVE LANGUAGE

Used to understand verbal or written communication

EXPRESSIVE/ACTIVE LANGUAGE

The ability to translate ideas into your own words

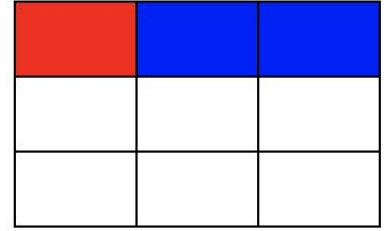
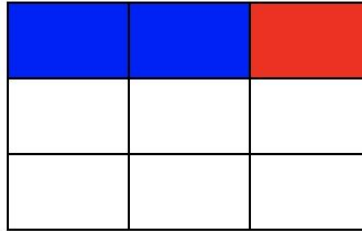
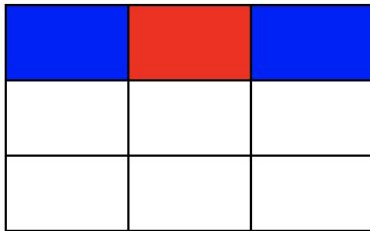
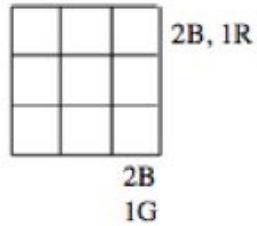
Thank you for attending our session!

The Color Square Game

Rules:

- The puzzle must contain 3 red tiles, 3 blue tiles, and 3 green tiles
- All tiles of the same color must be *contiguous* (share a side)

Complete as much of this color square as you can from the clues given.



Would you be able to put a green tile in the middle of the far left column? Justify your response.

Is there a unique solution to this problem? If so, explain why it is unique. If not, how many solutions exist?

The King's Dilemma

(Modified from CMP3)

One day in the ancient kingdom of Montarek, a peasant saved the life of the king's daughter. The king was so grateful he told the peasant she could have any reward she desired.

The peasant, the king, the queen, and the king's financial advisor all proposed a reward for the peasant.

The Peasant's Plan (Plan #1)

The peasant, the kingdom's chess champion, made an unusual request...

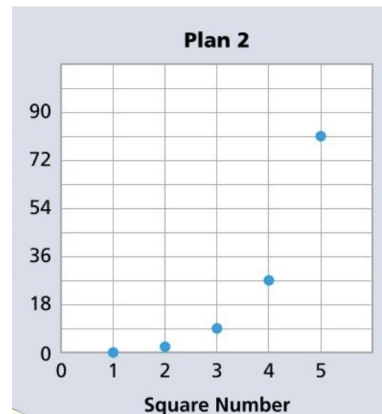
"I would like you to place 1 penny on the first square of my chessboard, 2 pennies on the second square, 4 on the third square, 8 on the fourth square, and so on. Continue this pattern until you have covered all 64 squares. Each square should have twice as many pennies as the previous square."



The King's New Plan (Plan #2)

The king told the queen about the reward the peasant requested. The queen said, "You have promised her more money than the entire royal treasury! You must convince her to accept a different reward."

After much thought, the king came up with Plan 2. He would make a new board with only 16 squares. Then he would place 1 penny on the first square and 3 pennies on the second. He drew a graph to show the number of pennies on the first five squares. He would continue this pattern until all 16 squares were filled.



The Queen's Plan (Plan #3)

The queen was unconvinced about the king's new plan. She devised Plan 3. Using a board with 12 squares, she would place 1 penny on the first square. She would use the equation $p = 4^{n-1}$ to figure out how many pennies to put on each square. In the equation, p is the number of pennies on square n .

The Financial Advisor's Plan (Plan #4)

The advisor proposed Plan 4. The king would put 20 pennies on the first square, 25 on the second, 30 on the third, and so on. He would increase the number of pennies by 5 for each square. He would continue this pattern until all 64 squares are covered.

For each plan, how many pennies are on the final square?

Which plan do you think is the best plan for the peasant? For the kingdom? Justify your choices.

Why do you think the financial advisor proposed his plan?

Choose A Discourse Strategy From Today's Session

I Notice...I Wonder...
Always, Sometimes, Never
Which One Doesn't Belong?
Fraction Talks
If I Only Had One Question

Fermi Questions

[Would You Rather?](#)* (wouldyourather.com)

[Graphing Stories](#)* (graphingstories.com)

[Interactive Think Aloud](https://mathematicstrategies.weebly.com/interactive-think-aloud.html)* (<https://mathematicstrategies.weebly.com/interactive-think-aloud.html>)

[Define & Clarify](https://www.middleweb.com/15728/deepen-student-math-discussions/)* (<https://www.middleweb.com/15728/deepen-student-math-discussions/>)

* Not explored in today's session. See individual link for additional information.

The Discourse Strategy + Mathematical Content

What are the key mathematical concepts present in the task?

How does this DS support/solidify the conceptual understandings present in the task?

The Discourse Strategy Framework

Goal: Use this strategy to build student mathematical identity, sense of belonging in the math class and to by open spaces for all students to talk-think-learn!

WHEN would you incorporate this strategy to meet the needs of all your students?

HOW would you use strategy to meet the needs of all your students?