UNPRODUCTIVE STRUGGLE

~~*Finding the tipping point between productive struggle and just struggle*~~

A Bunch of Teachers' Journey to learn about struggle

WHO ARE WE?

Cypress Hills Community School, Brooklyn NY

- Inés Ellis-Guardiola, Bilingual Math Coach (11 years teaching & learning & coaching)
- Jasmin Chino, Bilingual 5th Grade Math/Science Teacher at PS89 (3 years teaching & learning)
- Sara Siddappa, Assistant Principal (15 years teaching & learning & coaching & leading)

CYPRESS HILLS COMMUNITY SCHOOL

- PreK-8th Grade Dual Language school
- Enrollment 474
- Free/Reduced Lunch: 94%
- ELL Population: 47%
  - 23% of ELL population is Entering/Emerging
  - 18% have been in the country <2 years
- Special Needs Population: 27%

MATH EVOLUTION AT CYPRESS HILLS

2007-2009

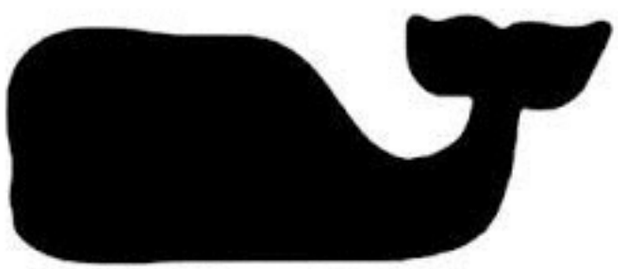
NYS Math Standards-Based curriculum using Everyday Mathematics and Marilyn Burns

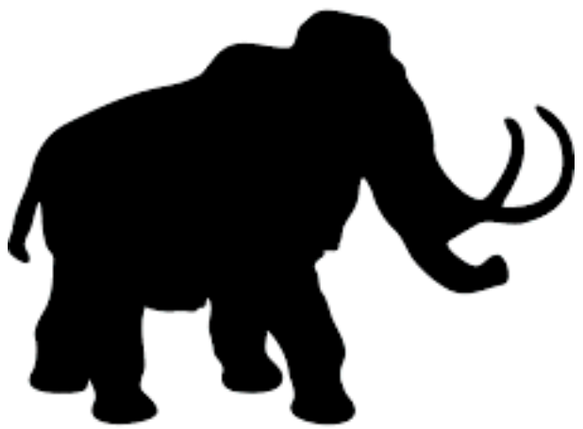
2010-2013

Common Core Standards + NYS Math Standards using Investigations and developing standards based assessments aligned to CCSS in grades K-8

2013-2015

Common Core Standards using Engage NY, CMP3, and GoMath! and refining assessments to address CCSS





TEACHER SAFE SPACE

FALL OF 2016

- modeling solution pathways
- creating worksheets tied directly to the unit being taught
- differentiating through modifying problems to avoid struggle
- analyzing student work from a deficit standpoint

PRODUCTIVITY IN ABSENCE OF STRUGGLE

- Complete work
- Focus was on the “doing” rather than the “thinking”
- Procedural teaching (I do, you do, we do)
- Everyone using the same strategy
- Support students in thinking

WHY CHANGE?

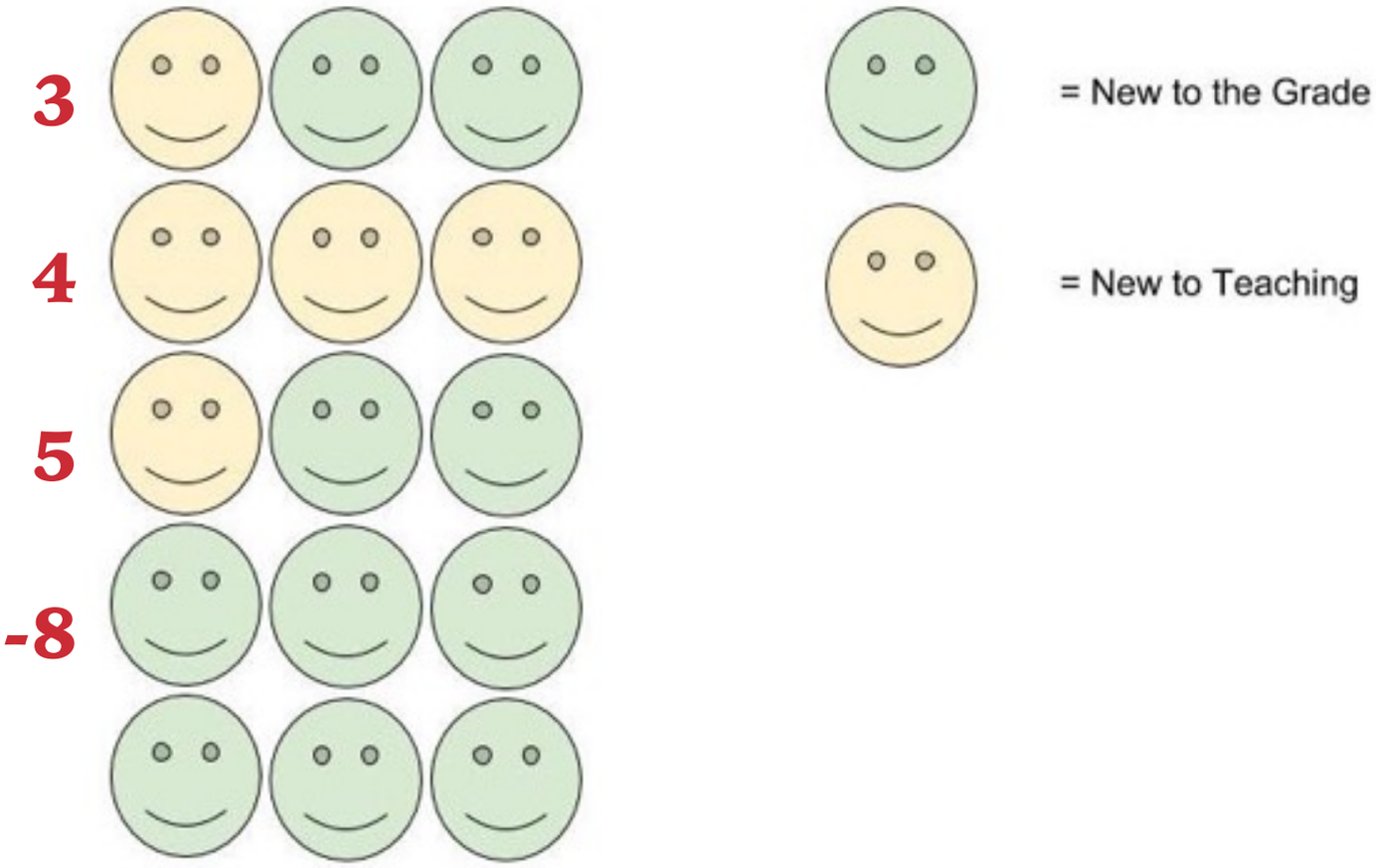
- We believe that e**quity** should drive instruction at our school (Jo Boaler)
- We believe **mindset** around math teaching needs to shift from a deficit model to a strength based model
- We believe that teachers and administrators need to become students of mathematics again

PRODUCTIVE STRUGGLE

- How do we shift the mindset of our teachers from avoiding productive struggle to embracing it?

Challenge: All teachers in grades 3-8 were new to the math on that grade level

Opportunity: 5 of the 9 teachers in the 3-5 Team were new to teaching



2016-2018 EMBRACING OPPORTUNITY

- Algebra 2020 (#goals)
- Use Engage NY as a base curriculum to implement
    - **problem based lessons** (exploration)
    - stations (targeted instruction)
- Incorporate Number Talks for fluency
- Assess with standards based assessments
    - Re-engage students in assessment task or similar task
    - Reflect on learning

PROBLEM BASED LESSONS

- Our math program hinges on engaging **all** students in challenging math problems in order to "unlock" math concepts through the exploration and discussion of solution pathways.
- Building student confidence in math is not just about telling them they can, it's about **believing** that they can and providing them the support they need in order to be able to succeed.

> I think my tendency in the past was to differentiate and level activities so that struggling students had relatively easier problems.

-Craig, DL Special Ed

PLC 1

Winter 2017

ALL 9 teachers in grades 3-5 volunteered their time to dig in to productive struggle via PLC*

Spring 2017

6 Meetings on Friday afternoons**

3 Intervisits

1 Presentation to the School Staff

Fall 2017

All math teachers in grades 1-8 adopt low floor high ceiling problem based lessons to establish routines that deal with struggle

** with some gentle cajoling from the math coach*

*** with the promise of good snacks*

GOALS AND STRUCTURE

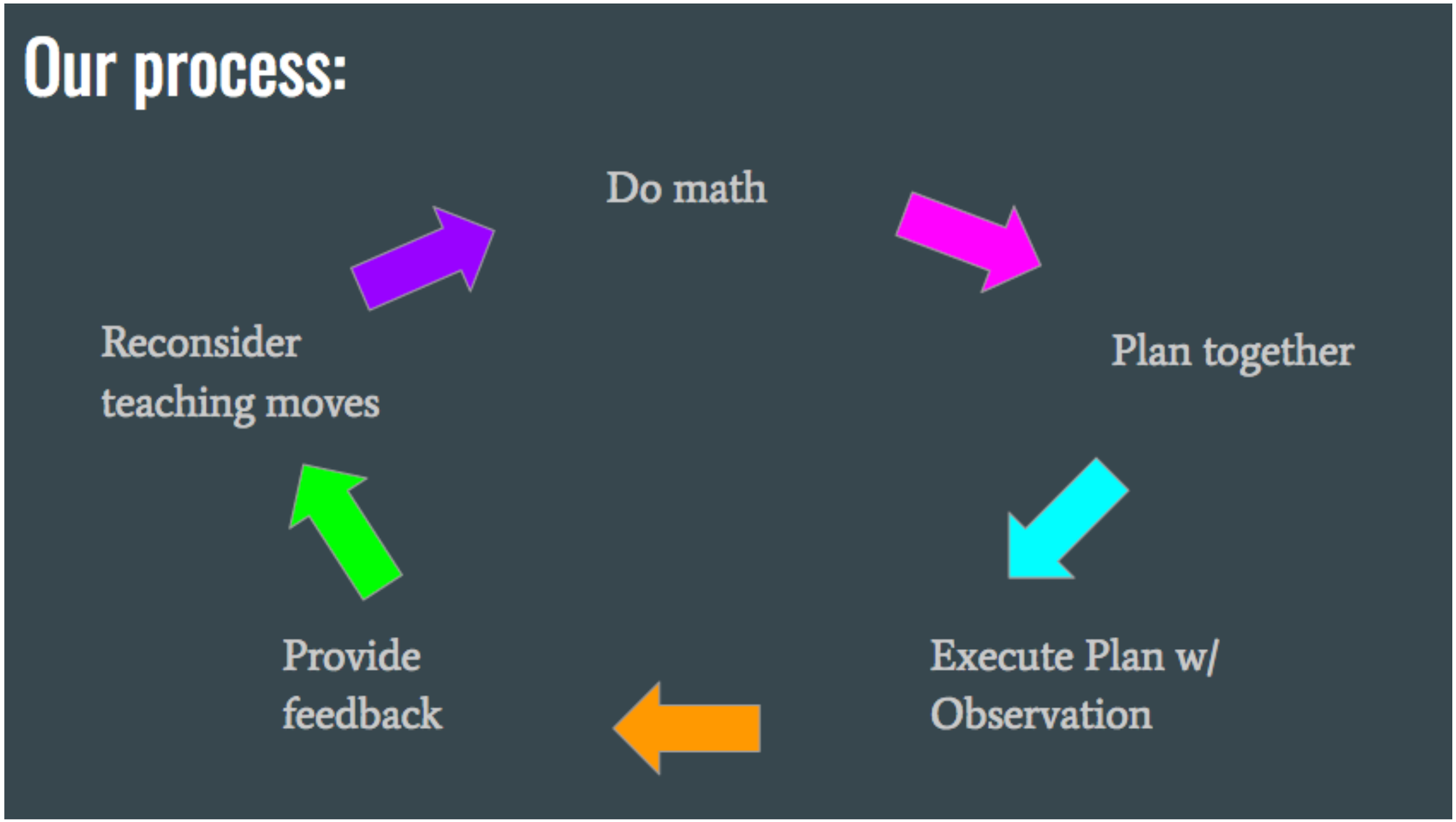
Goals:

- To encourage high levels of student thinking and participation that culminate in meaningful work products
- To explore and establish common practices around low floor high ceiling task implementation
- To understand struggle/our student's limits more clearly

Structure:

- Teacher as researcher
- Students as subjects
- When we met we focused on student discussions and interactions

WE LOVE A GOOD CYCLE



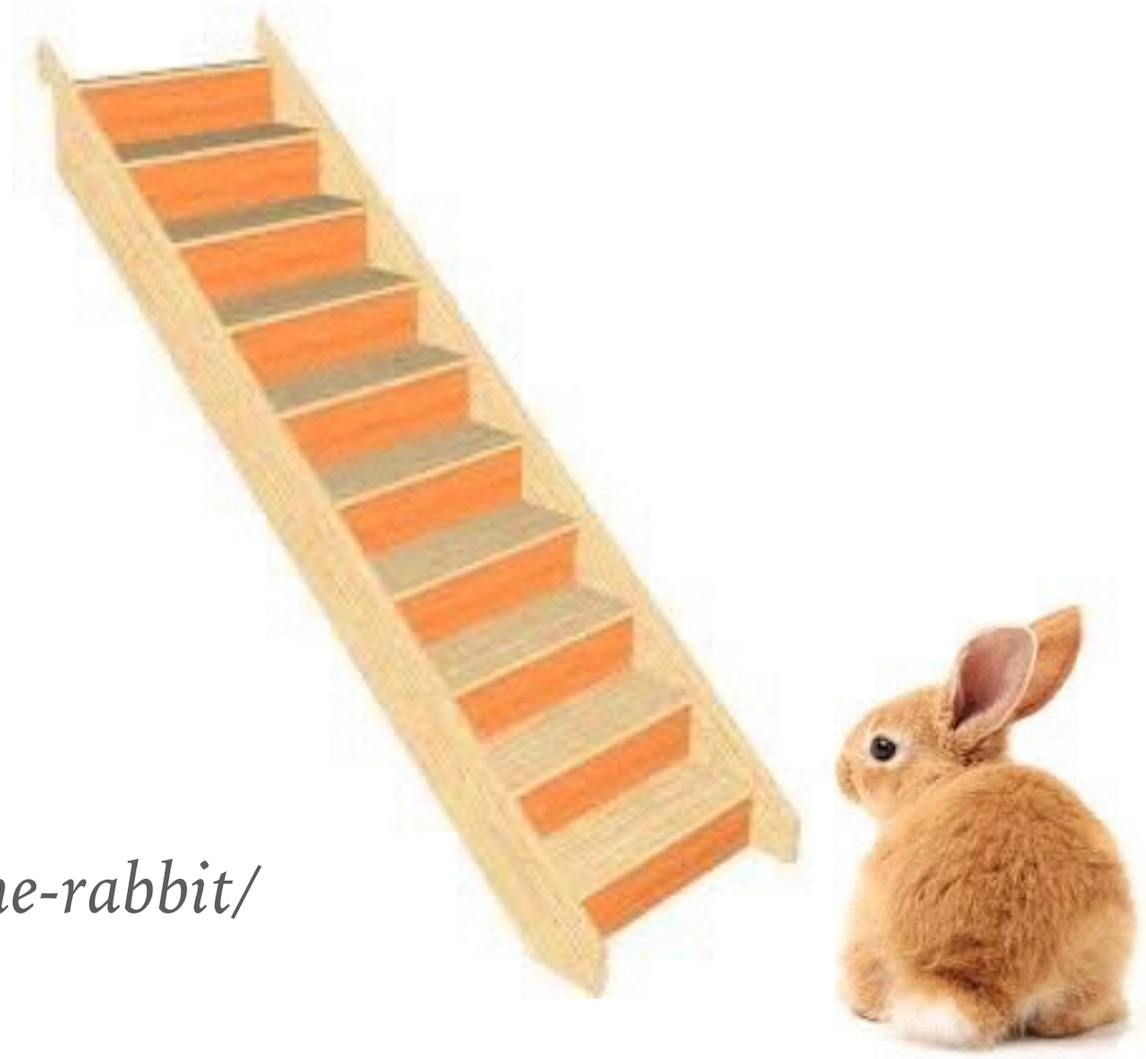
“

Struggling doesn't sound like something anyone would do willingly.

-Oscar, G4 DL

LEO THE RABBIT (YOUCUBED)

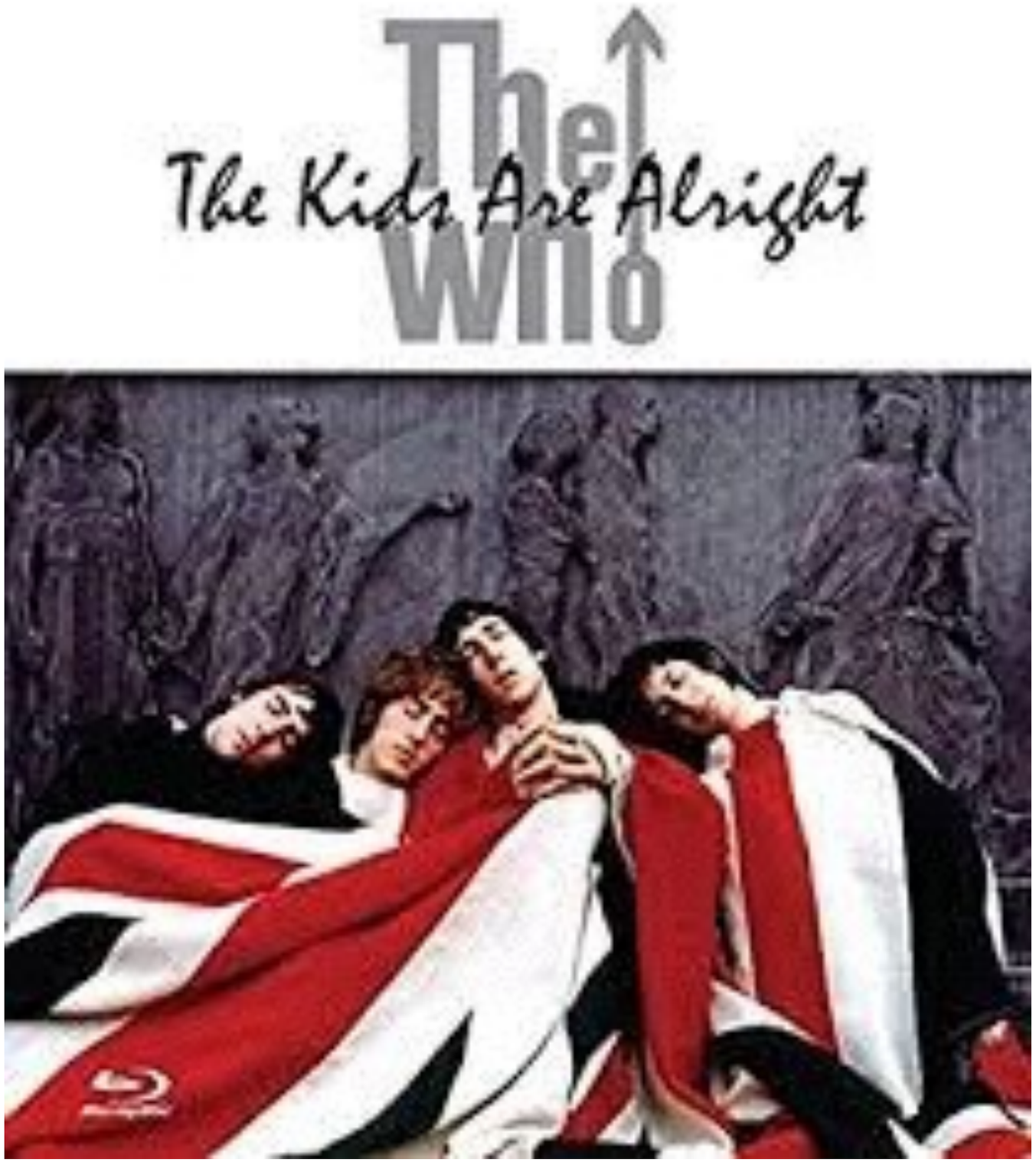
Leo the Rabbit is climbing up a flight of 10 steps. Leo can only hop up 1 or 2 steps each time he hops. He never hops down, only up. How many different ways can Leo hop up the flight of 10 steps? Provide evidence to justify your thinking.



https://www.youcubed.org/tasks/leo-the-rabbit/

LEARNING TARGETS FOR LEO THE RABBIT

- I can develop different pathways to solve a math problem by listening to my peer's mathematical conversations.
- I can monitor my feelings and struggle while solving a problem.



OUR MANTRA

THE KIDS ARE ALRIGHT

THE KIDS ARE ALRIGHT

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THE KIDS ARE ALRIGHT

G4 LEO THE RABBIT

- Are the students showing signs of productive struggle?
- How do you know?

DISCUSS

- Are the students showing signs of productive struggle?
- How do you know?
- What do we hope would be the next teacher move (if any)?

OSCAR'S NEXT STEPS

- Stop the class about 5 seconds after this video ends
- Asked students to consider smaller cases
- Teacher-led discussion (T:S)
    - How many ways could Leo go up one stair?
    - How many ways could Leo go up two stairs?
    - How many ways could Leo go up three stairs?

LEO THE RABBIT: WHAT DID WE SEE?

From the students:

- Initial attempts to solve the problem
- Set up models after exploring materials
- Needed time to approach the task independently
- Influenced by teacher moves

From the teacher

- Timed intervals (5 minutes to explore,15 minute teacher led discussion, 5 minutes to continue working)
- Circulating and commenting
- Prescribed student tools in advance

OUR TAKEAWAYS

- Leave the tools to choice
- Structure the lesson with
  - Time to read the problem
  - Time to share about the problem
- Ask questions only after observation of student work and student interaction

7 FLIPPED (NRICH MATH)

1. You have seven color disks in a line, all on the same color.
2. These disks all have to be turned over, but you can only turn over exactly three at a time.
3. You can choose the three from anywhere in the line.
4. A disk may be turned over on one move and turned back over again on another.

- ➤ What is the smallest number of moves you can do this in?
- ➤ Try with other numbers of disks (up to 20).
- ➤ Do you notice any patterns in your findings?
- ➤ Can you explain why these patterns occur?

https://nrich.maths.org/4871

7 FLIPPED: WHAT DID WE SEE?

From the students:

- Engaged with task for 15 minutes
- Resilience in problem solving, staying on task
- Questioning each other's solutions w/o frustration

From the teachers:

- Restraint in intervention
- Wait time and careful observation
- Intervention to push thought
    - increasing the case
    - same pathway with different cases required specific questioning
    - work backwards from the end

WE FOUND OUR BRAVE SPACE

- Seeking out opportunities to solve difficult problems in teacher teams
- Remembering our mantra: "The kids are alright"
- Creating conditions for productive struggle (routines)
- Leveraging teacher moves to encourage productive struggle (when do I step in, if at all, and with what?)

> If I've learned anything through these workshops, it's that we as teachers should let our students struggle. Doing this in my classroom has allowed for conversations I wouldn't have otherwise. I've learned that the idea of productive struggling allows students to dig deep into their mathematical arsenals to find tools that may help them. Since taking part in these workshops, I've noticed quite the number of students take the initiative and attempt to complete tasks with one another despite their difficulty.

-Oscar, G4 DL

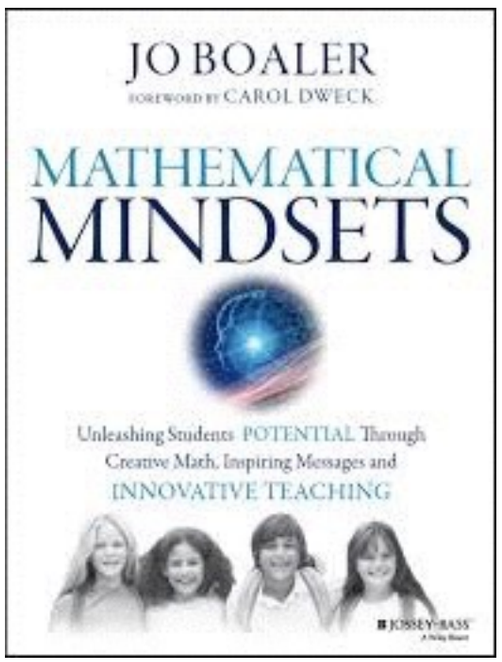
“What I truly appreciated about the way we kicked off this year in math is how we emphasized the importance of "embracing mistakes." While I do think there are times when differentiation and modifications to certain activities make sense, I also definitely see the benefit of one common learning activity/challenge that students innately individualize [for] themselves with their approach to solving the problem. It's with problems like these when we get to see the surprise hidden gems of knowledge in all students because they feel like that have something to bring to the table.

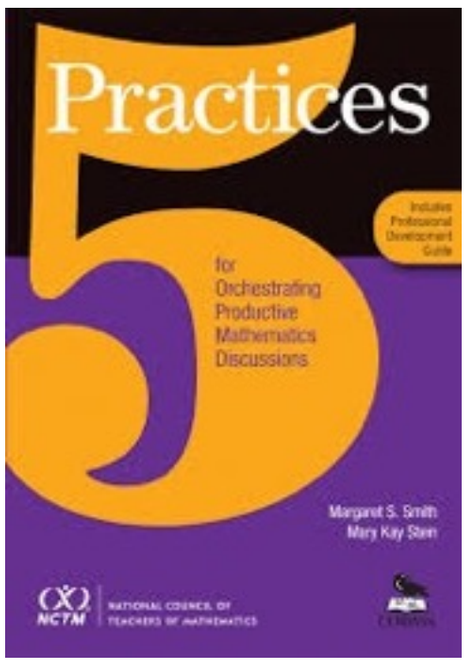
-Craig, DL Special Ed

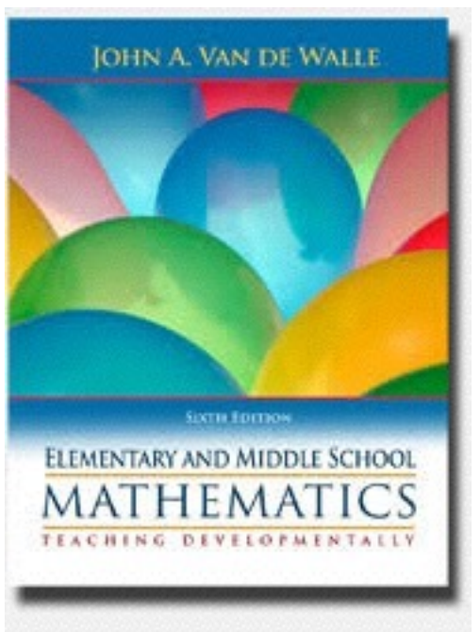
“When I worked on this problem I felt challenged and it made me want to work really hard. My brain hurt.

-KV, 3rd Grade

RESOURCES







Growth Mindset

Classroom Practices

Content Understanding