Board of Education Presentation

Mathematics 6-12 Instructional Initiatives

December 4, 2024

A Look Back at Math Education

- Industrial Revolution - shift to practical subject learning; demand for **basic arithmetic skills**.

- Early 20th Century - Expansion of content to include algebra and geometry; Progressive Education Movement emphasizes **student-centered learning and real-world problem solving skills**.

- Post WWII Era - federal investment in math and sciences through programs like National Defense Education Act; "New Math" movement introduces abstract concepts, with an **emphasis on understanding over rote learning.**

A Look Back at Math Education

- 1970’s and 1980’s - focus **returns to traditional arithmetic and computational skills** due to failure of “New Math” movement; push for rigorous math reform and standardized testing after *A Nation At Risk* report.

- 1990’s and Early 2000’s - beginning of standards-based reforms and **integration of technology (calculators) allowed for more dynamic approaches to teaching mathematics.**

So where are we today?

New York State Next Generation

Mathematics Learning Standards

Updated June 2019

2017

Context for Revision of the *NYS Next Generation Mathematics Learning Standards (2017)*

Changing expectations for mathematics achievement

Today's children are growing up in a world very different from the one even 15 years ago. Seismic changes in the labor market mean that we are living and working in a knowledge-based economy—one that demands advanced literacy and Science, Technology, Engineering and Mathematics (STEM) skills, whether for application in the private or public sector. Today, information moves through media at lightning speeds and is accessible in ways that are unprecedented; technology has eliminated many jobs while changing and creating others, especially those involving mathematical and conceptual reasoning skills. One characteristic of these fast-growing segment of jobs is that the employee needs to be able to solve unstructured problems while working with others in teams. At the same time, migration and immigration rates around the world bring diversity to schools and neighborhoods. The exponential growth in interactions and information sharing from around the world means there is much to process, communicate, analyze and respond to in the everyday, across all settings. For a great majority of jobs, conceptual reasoning and technical writing skills are integral parts to the daily routine.

To prepare students for the changes in the way we live and work, and to be sure that our education system keeps pace with what it means to be mathematically literate and what it means to collaboratively problem solve, we need a different approach to daily teaching and learning. We need content-rich standards that will serve as a platform for advancing children's 21st-century mathematical skills —their abstract reasoning, their collaboration skills, their ability to learn from peers and through technology, and their flexibility as a learner in a dynamic learning environment. Students need to be engaged in dialogue and learning experiences that allow complex topics and ideas to be explored from many angles and perspectives. They also need to learn how to think and solve problems for which there is no one solution—and learn mathematical skills along the way.

What NCTM Says…

NCTM | NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS

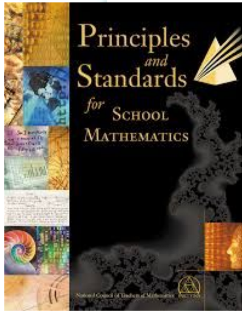
Six Points About the Vision of Math Education

NCTM recognizes problem solving as a fundamental goal of learning mathematics.

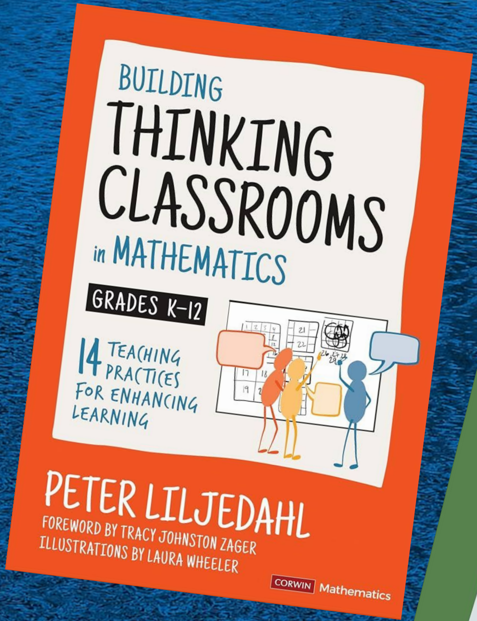
NCTM is not alone in recognizing problem solving as a primary goal of mathematics. Many mathematicians and scientists have written in support of this goal.

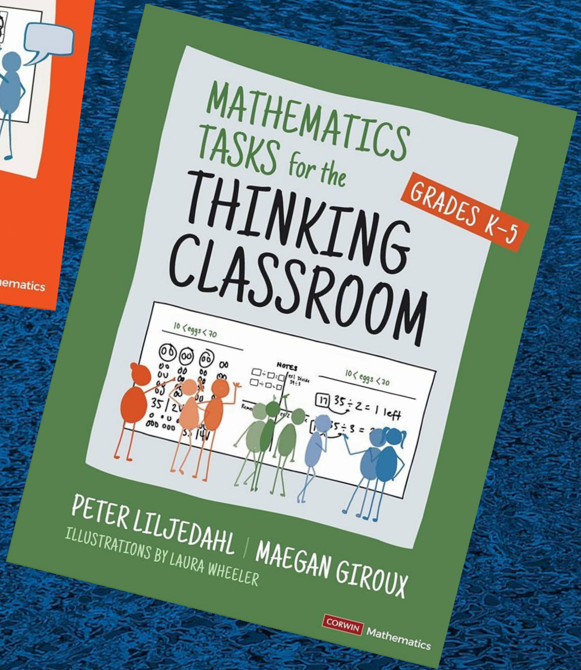
NCTM promotes teaching with understanding.

There is no "right way" to teach, but effective mathematics teaching requires continuous efforts by teachers to learn and to improve themselves. They must be knowledgeable in mathematics, be able to select suitable curricular materials, and use appropriate instructional tools and techniques to support mathematics learning in their classrooms.



LEVITTOWN PUBLIC SCHOOLS

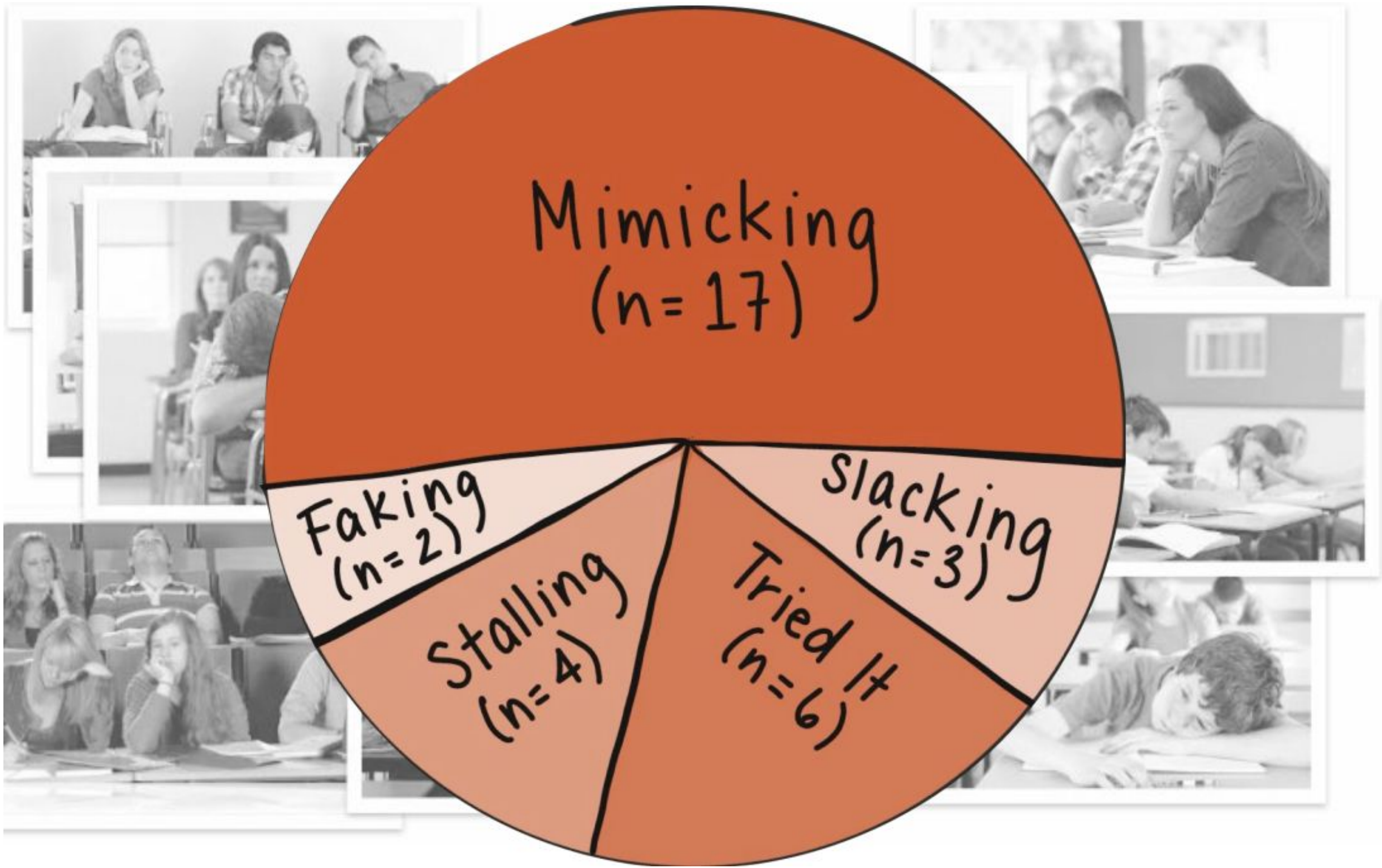




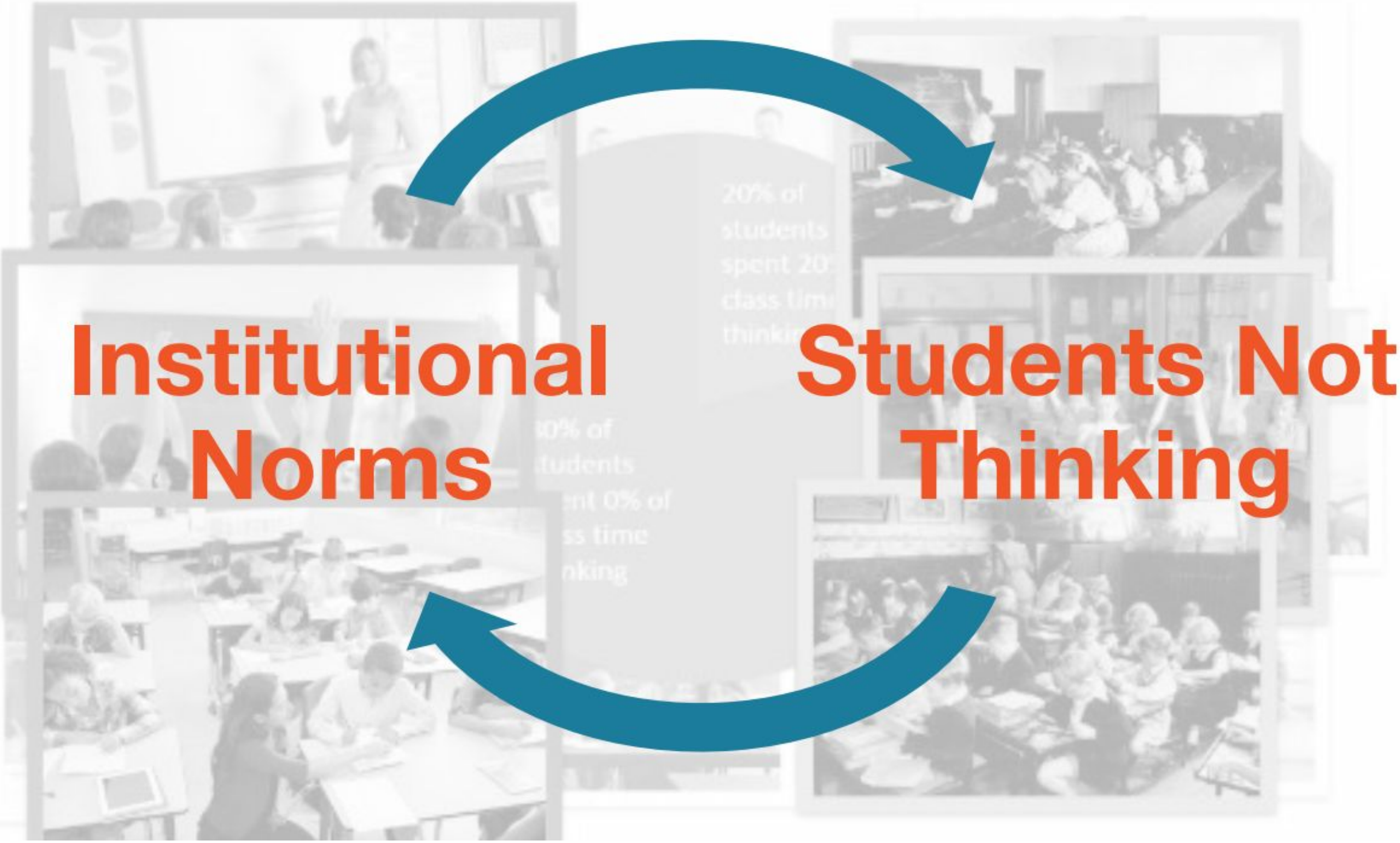
Dr. Peter Liljedahl

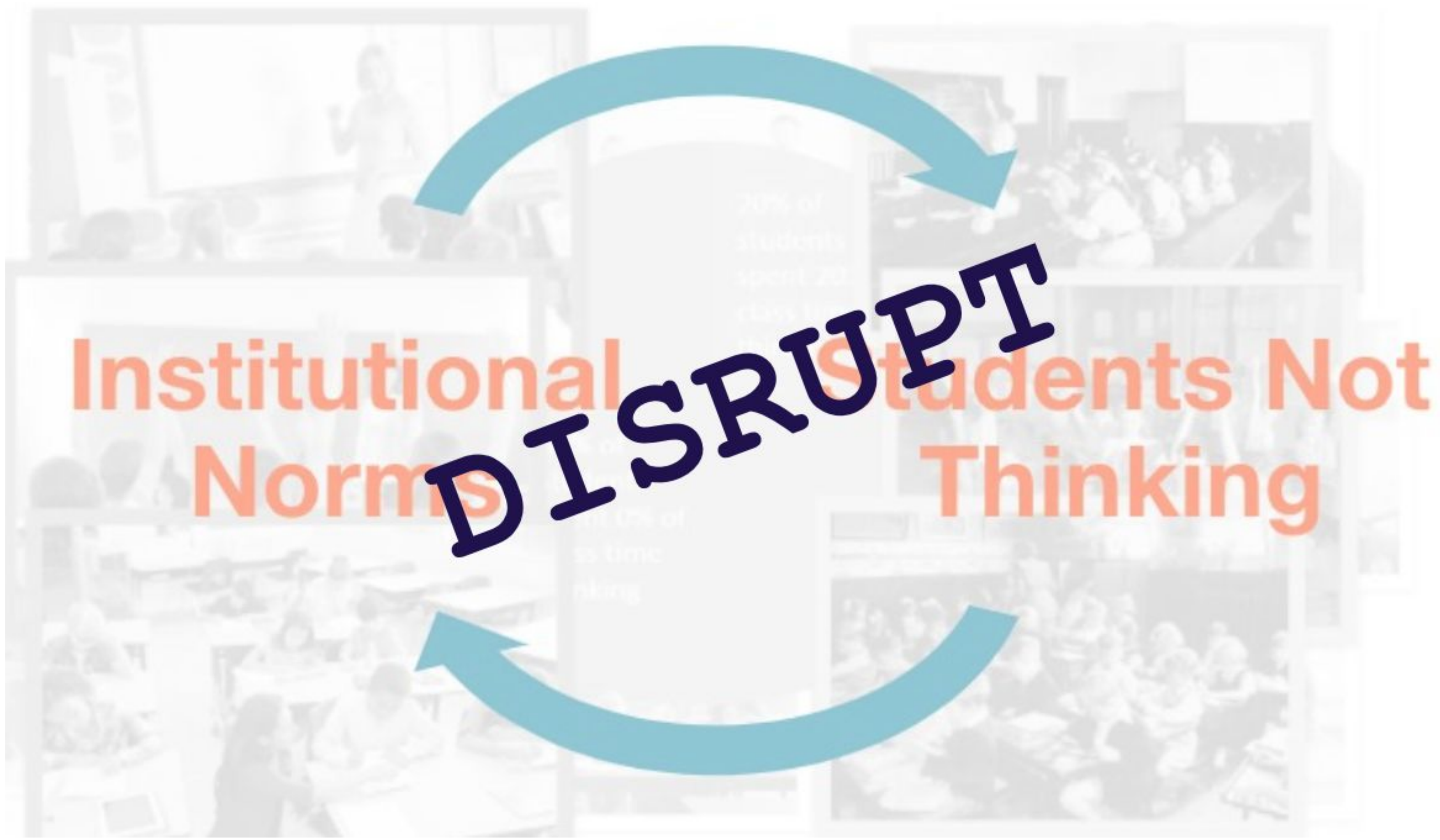
- Dr. Peter Liljedahl is a professor of mathematics education at Simon Fraser University in Vancouver, Canada. Peter has authored or coauthored numerous books, book chapters, and journal articles on topics central to the teaching and learning of mathematics, and is most known as the author of the global phenomenon *Building Thinking Classrooms in Mathematics: 14 Practices for Enhancing Learning* (Corwin 2020).
- A former high school mathematics teacher, Peter has dedicated his life's work to the improvement of education. Among his greatest joys is working with students and educators in classrooms around the world—learning and sharing about what helps students think more and think longer. He has kept his research close to the classroom and is a sought-after speaker and professional development facilitator, traveling the world giving talks, and working with educators on the topic of Building Thinking Classrooms for which he has won the Cmolik Prize for the Enhancement of Public Education and the Fields Institute's Margaret Sinclair Memorial Award for Innovation and Excellence in Mathematics Education.

" Students, as it turns out, want to think-- and think deeply.



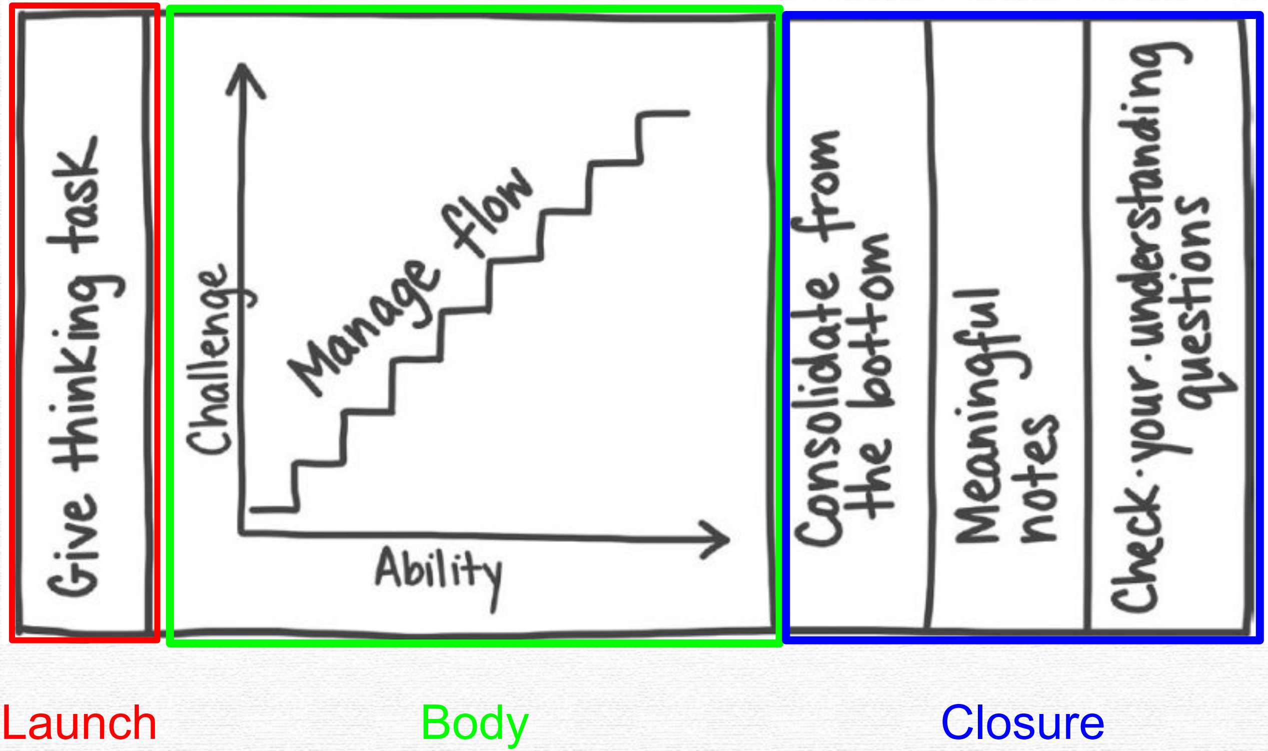
Mimicking
(n=17)
Faking
(n=2)
Stalling
(n=4)
Tried It
(n=6)
Slacking
(n=3)


Institutional Norms
Students Not Thinking


Institutional Norms
DISRUPT
Students Not Thinking

	CLASSROOM PRACTICES	*OPTIMAL* PRACTICES FOR THINKING
1	What are the types of tasks we use?	Use thinking tasks
2	How we form collaborative groups?	Form frequent visibly random groupings
3	Where students work?	Use vertical non-permanent surfaces
4	How we arrange the furniture in our classroom?	*Defront* the classroom
5	How we answer questions?	Only answer keep thinking questions
6	When, where, and how tasks are given?	Give tasks early, standing, and verbally
7	What homework looks like?	Give check your understanding questions
8	How we foster student autonomy?	Be intentionally less helpful
9	How we use hints and extensions?	Create and manage *flow*
10	How we consolidate a lesson?	Consolidate from the bottom
11	How we give notes?	Use meaningful notes
12	What we choose to evaluate?	Evaluate what you value
13	How we use formative assessment?	Communicate to students where they are and where they are going
14	How we grade?	Report out based on data (not points)

Lesson Design in a Thinking Classroom



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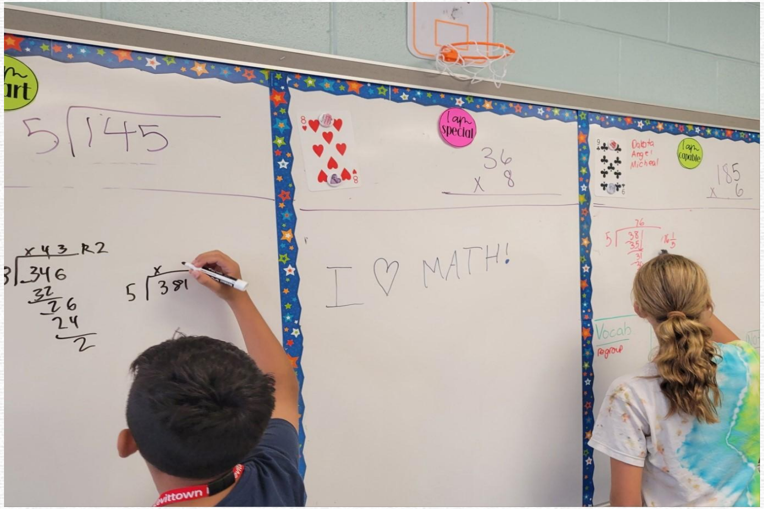
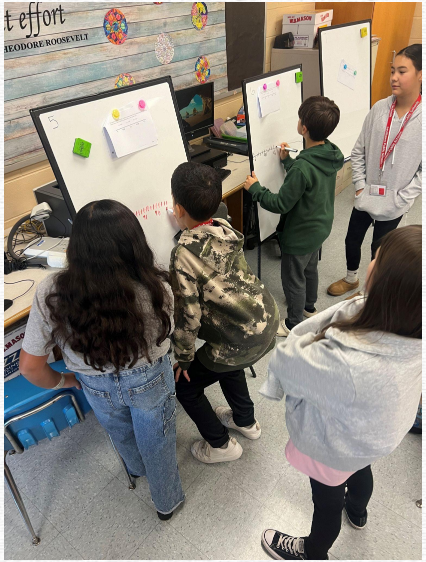
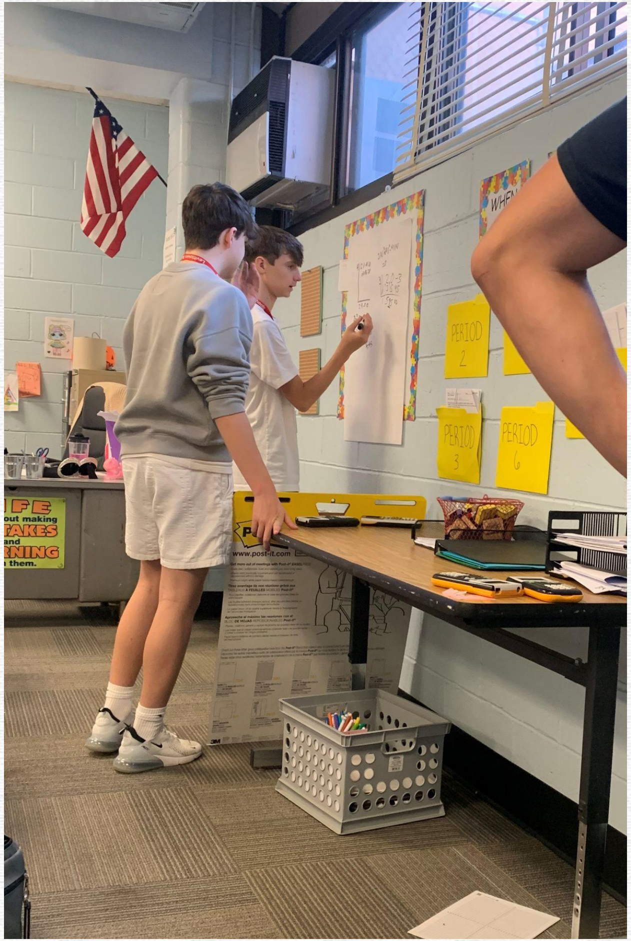
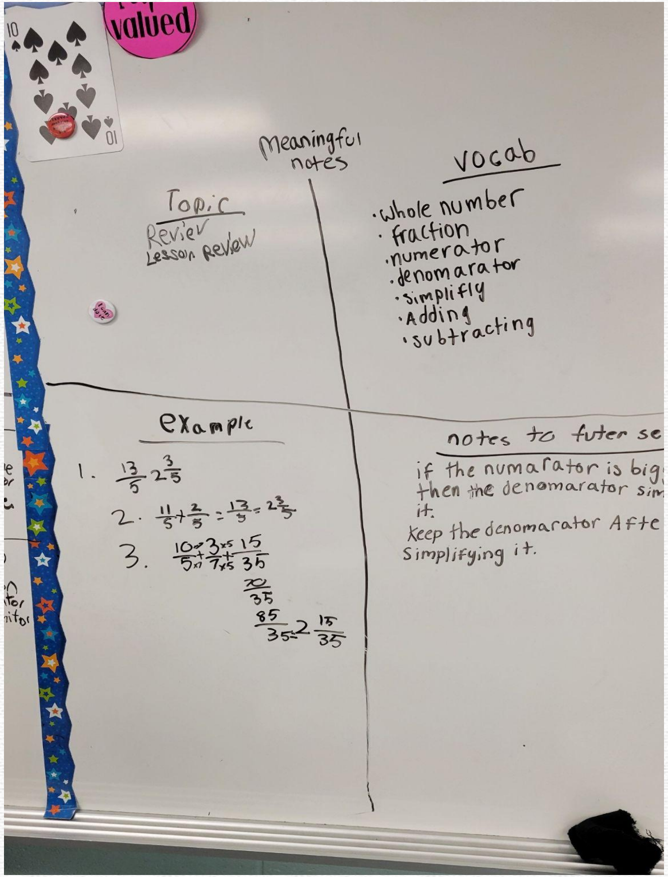





PERIOD 2
PERIOD 3
PERIOD 6

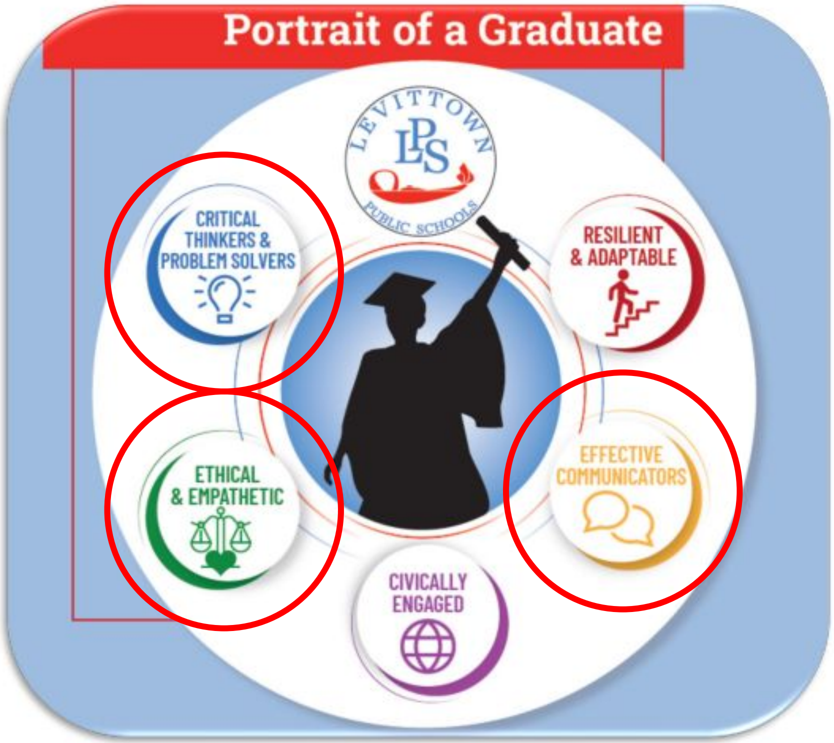

valued
Meaningful notes
Topic
Review
Lesson Review
vocab
·whole number
·fraction
·numerator
·denomarator
·simplifly
·Adding
·subtracting
example
1. 13/5 2 3/5
2. 11/5 + 2/5 = 13/5 = 2 3/5
3. 10/5 + 3/7 15/35
70/35
85/35 = 2 15/35
notes to futer se
if the numarator is big
then the denomarator sim
it.
Keep the denomarator Afte
simplifying it.

Create dynamic groups.

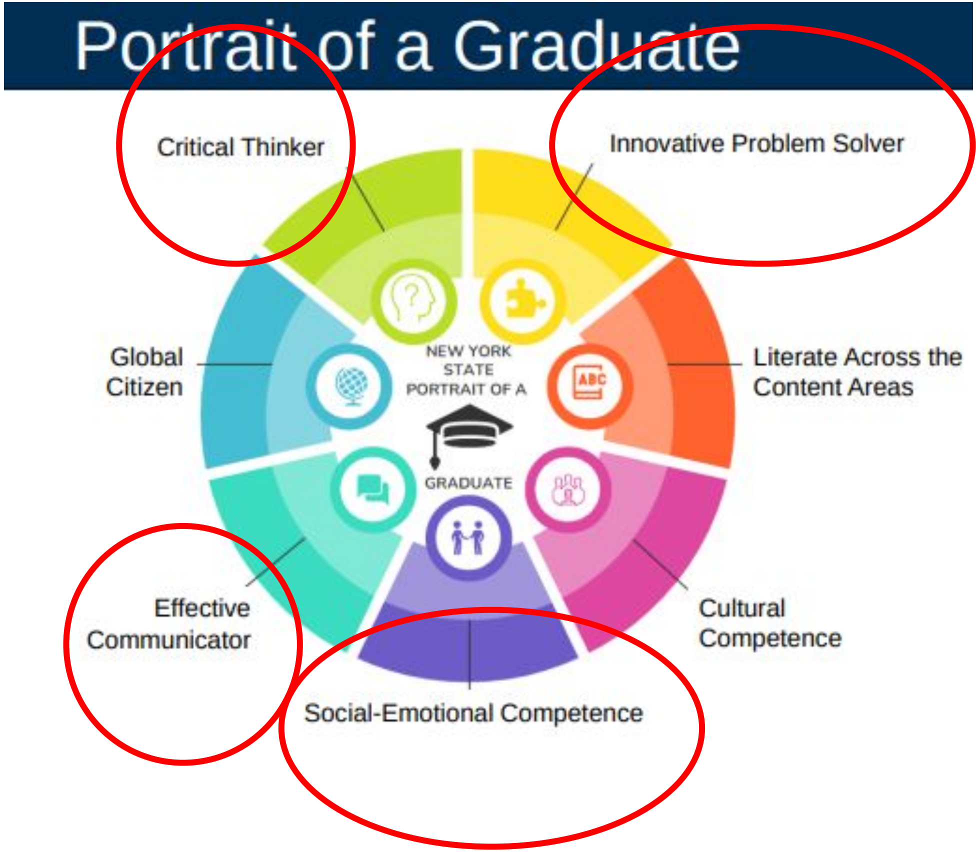
Ensure that there is commonality and diversity.

Unlock empathy.

Students have tremendous capacity to take care of each other's learning.



Portrait of a Graduate
LEVITTOWN
LPS
PUBLIC SCHOOLS
CRITICAL THINKERS & PROBLEM SOLVERS
RESILIENT & ADAPTABLE
ETHICAL & EMPATHETIC
EFFECTIVE COMMUNICATORS
CIVICALLY ENGAGED



Portrait of a Graduate
Critical Thinker
Innovative Problem Solver
Global Citizen
NEW YORK STATE PORTRAIT OF A GRADUATE
Literate Across the Content Areas
Effective Communicator
Cultural Competence
Social-Emotional Competence

Teacher Testimonials on *BTC*

What Our Students Are Saying (About BTC)...

Do you like working at the whiteboards? Why or why not?

yes I think it gets us thinking and connecting
with other members of class
bouncing ideas off each other and finding a solution

Do you like working at the whiteboards? Why or why not?

Yes, it's more interesting / engaging
than a standard lesson

Do you like working at the whiteboards? Why or why not?

Yes, I think it helps
me ACTUALLY do
the work, & help with
understanding the
material

What Our Students Are Saying (About BTC)...

Do you like working at the whiteboards? Why or why not?

I like working on the whiteboards, it helps you problem solve with other people

Do you like working at the whiteboards? Why or why not?

Yes, I love whiteboards bc it makes me think lol

Do you like working at the whiteboards? Why or why not?

Yes, I dont feel stuck on questions when I work with others, and it is such a nice change of pace rather then just sitting the entire time.

LEVITTOWN PUBLIC SCHOOLS

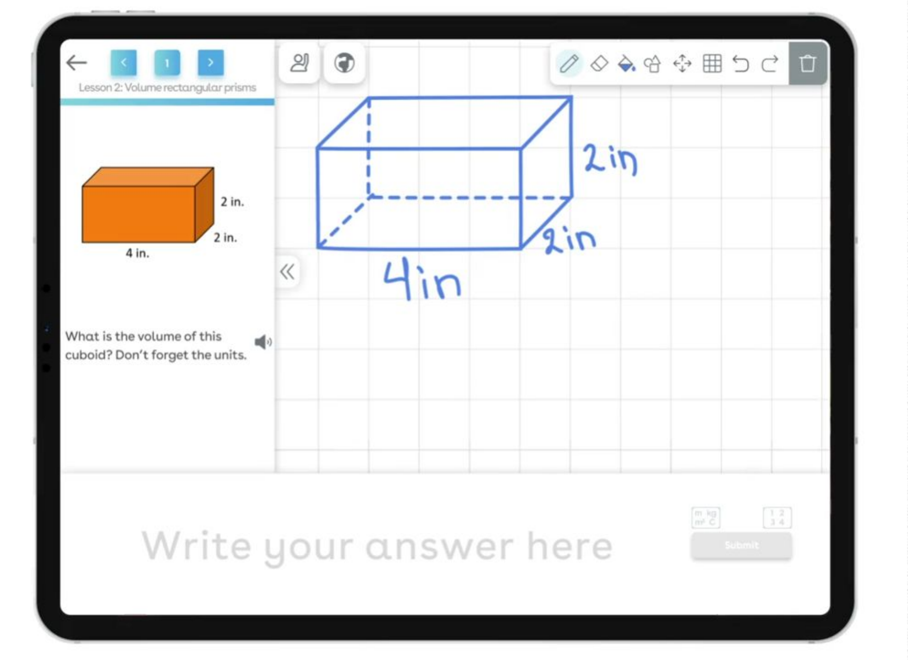
magma

for Grades 6-8

“Show Your Work”

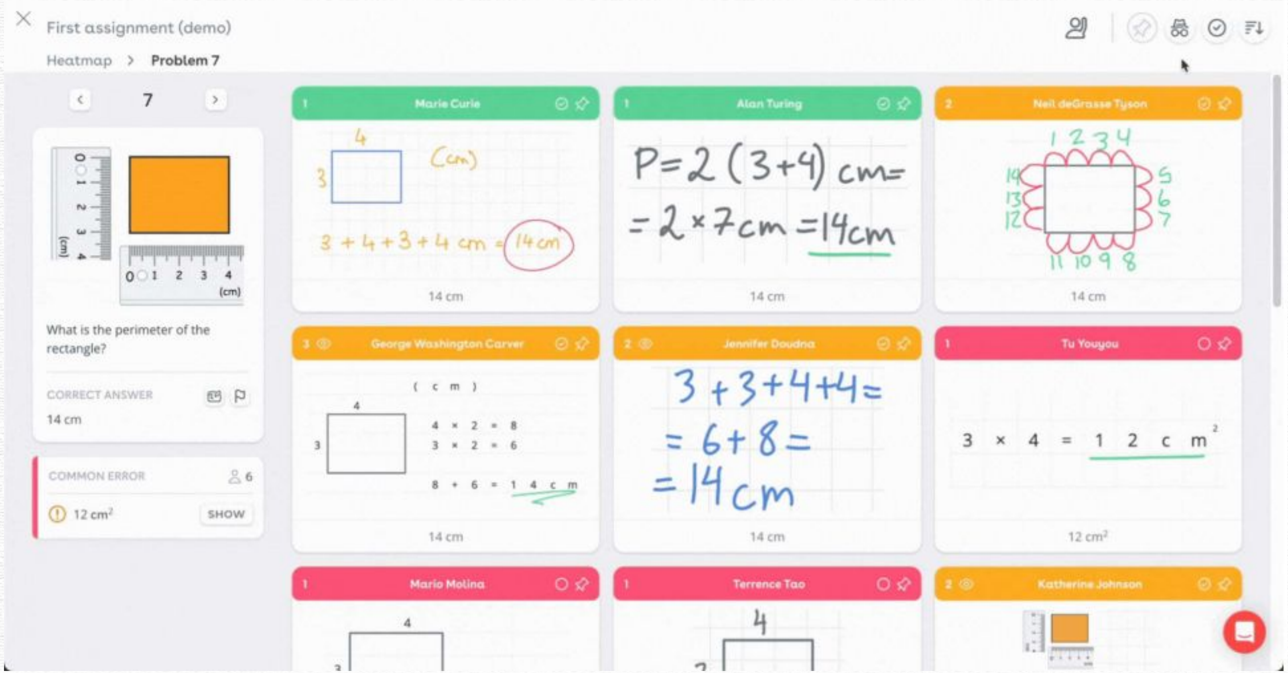
- Only digital resource that shifts the focus from solely receiving an answer to seeing student work in finding the solution.

- Teachers can “see” student thinking as it relates to the math they are practicing.



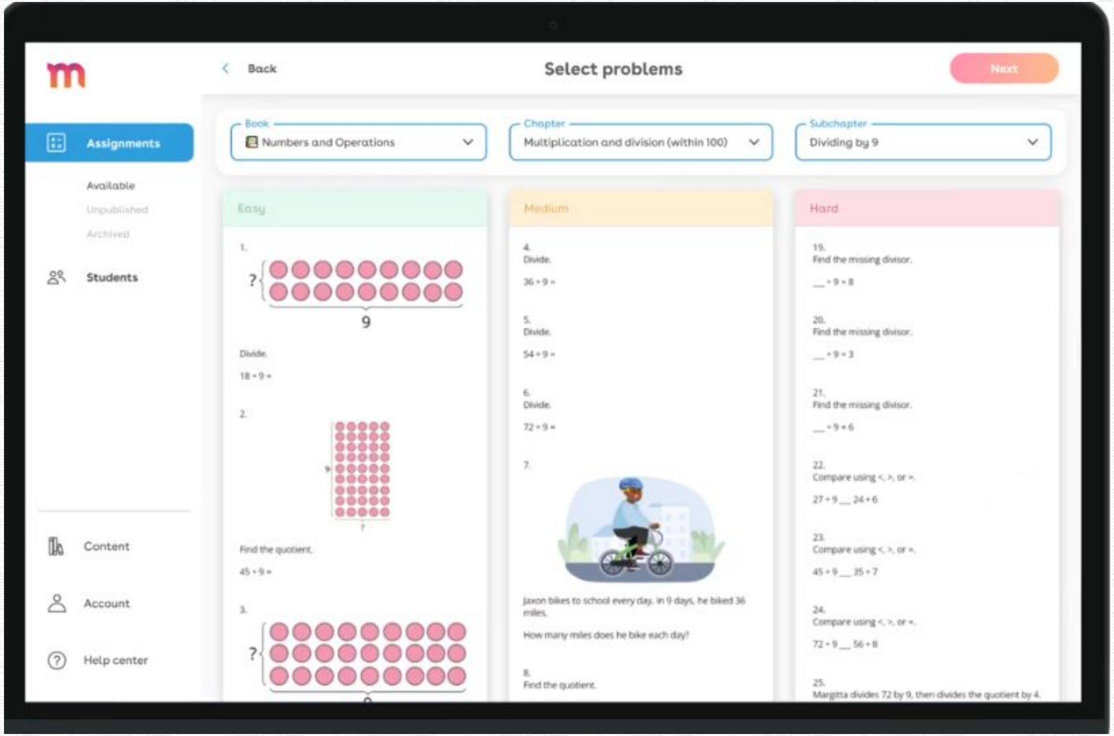
Enhance Mathematical Discussions

- Teachers can see all student solutions to practice problems to help promote mathematical discourse and view different problem-solving approaches.



Differentiation Made Easy

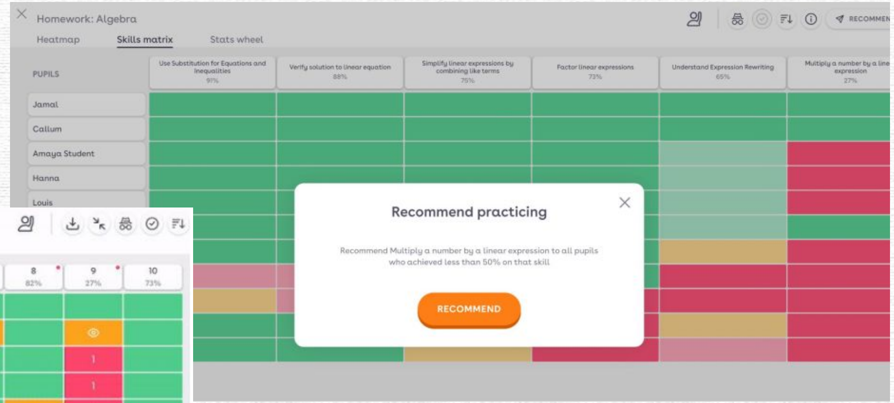
- Standards-aligned library of practice problems that scaffolds in rigor; allows for student choice.



Immediate Data for Teachers

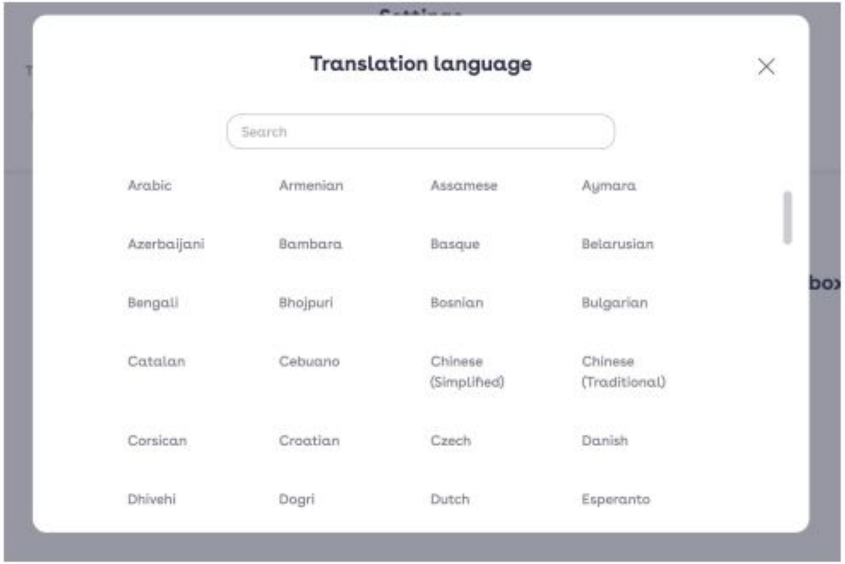
- Magma’s “heat map” gives a glimpse at student proficiency/ mastery of standards;

- AI integration allows teachers to identify common errors/ misconceptions and assign skills practice to support area of focus.

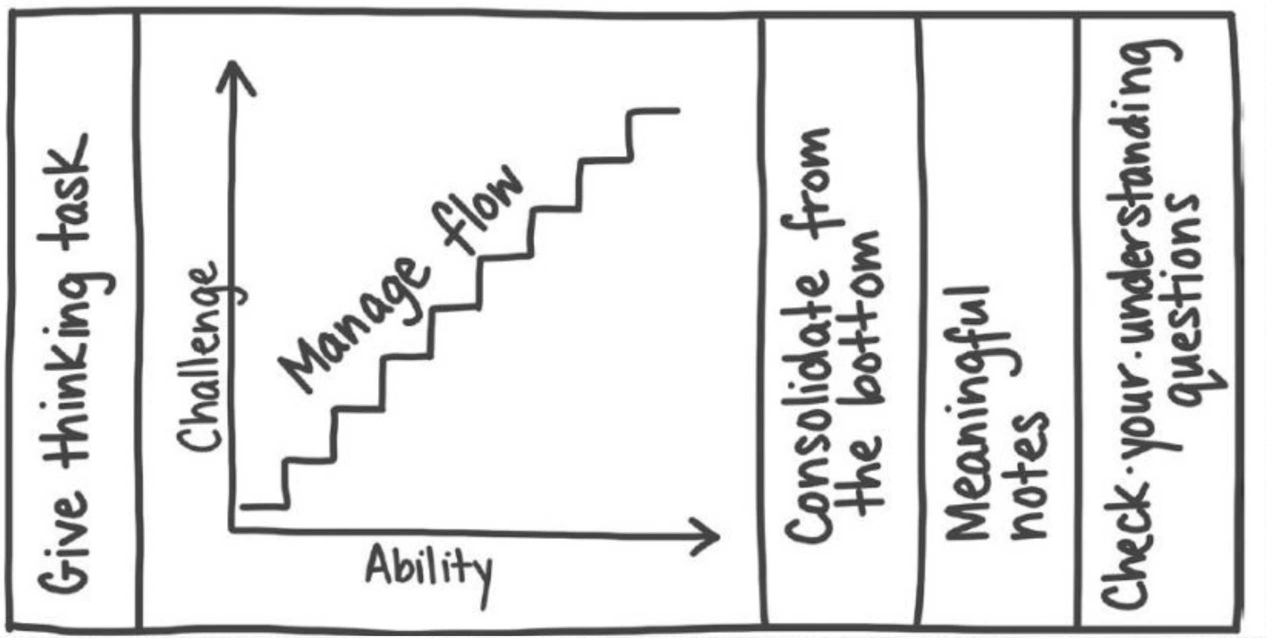


Ability to Support ENL Students

- Translation language resource allows teachers and students to toggle between English and student primary/ preferred language.



Where Does Magma Math Fit in a Thinking Classroom?



magma

magma

magma

When students are thinking, anything is possible.

Questions?