SPARK 2026

Building *Thinking* Classrooms PD

Presented by:

Victoria Rodgers



MEET YOUR *Facilitator*

VICTORIA RODGERS

- 5th Grade Teacher, Going in to Year 7
- Math Enthusiast
- Have Been Using BTC for 3+ Years

Looking forward to learning, thinking, and growing together!



CHECK-IN

Let's Get Started!

- What is your name?
- What site are you at?
- What grade do you teach?
- Choose a gif that best describes how you feel about teaching math!

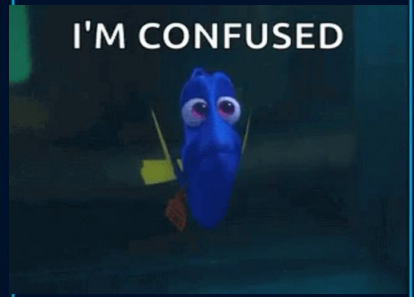
A



B



C



D



PD NORMS



Please be present & limit distractions.



Give the speaker (presenter, partner, colleague) your full attention.



Keep an open mind and express yourself with professionalism.



Honor time frames and transitions so we can stay on track as a group.



Keep students at the center of your work.

LEARNING INTENTIONS

By the end of this PD, you will:



Gain an **overarching view** of Building Thinking Classrooms (BTC).



Feel **ready** and prepared to start Toolkit 1 tomorrow.

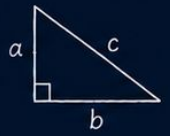


Boost your **confidence** in teaching math.



THINKING TASK TIME

$a^2 + b^2 = c^2$



THINKING Task

$y = mx + b$

$A = \frac{1}{2}bh$



$f(x) = r^2$



$C = 2\pi r$

$A = \pi r^2$

Four people are in a room.
Each person shakes hands with every other person once.

How many handshakes will there be in total?

05:00



Explain or show your thinking.

TURN *AND* TALK

03:00



How did that experience make you *feel*?

What did you *notice* about the process?

YOU JUST EXPERIENCED...

Toolkit 1



Everything you noticed wasn't accidental. It was intentional.

Peter Liljedahl organizes the 14 practices of Building Thinking Classrooms into 4 toolkits.



Today, we will focus on Toolkit 1—the foundation of a Thinking Classroom.

Pause, let's discuss the updated research.

TOOLKIT 1

1. Use thinking tasks
2. Frequently form visibly random groups
3. Use vertical non-permanent surfaces
12. Evaluate what you value

TOOLKIT 2

4. Defront the classroom
5. Answer only keep thinking questions
6. Launch early, standing, and verbally
8. Foster autonomy
9. Use flow

TOOLKIT 3

7. Give check-your-understanding questions
10. Consolidate from the bottom
11. Do note making

TOOLKIT 4

13. Communicate to students where they are and where they are going
14. Grade based on data, not points



One toolkit at a time. Purposeful practice. Powerful results.

THE FOUR TOOLKITS

Big Picture Snapshot

1

TOOLKIT 1

CREATING THE CONDITIONS FOR THINKING



1. Use thinking tasks
2. Frequently form visibly random groups
3. Use vertical non-permanent surfaces
12. Evaluate what you value

THE FOUNDATION

2

TOOLKIT 2

BUILDING STUDENT INDEPENDENCE



4. Defront the classroom
5. Answer only keep thinking questions
6. Launch early, standing, and verbally
8. Foster autonomy
9. Use flow

3

TOOLKIT 3

MAKING THINKING VISIBLE



7. Give check-your-understanding questions
10. Consolidate from the bottom
11. Do note making

4

TOOLKIT 4

COMMUNICATING LEARNING



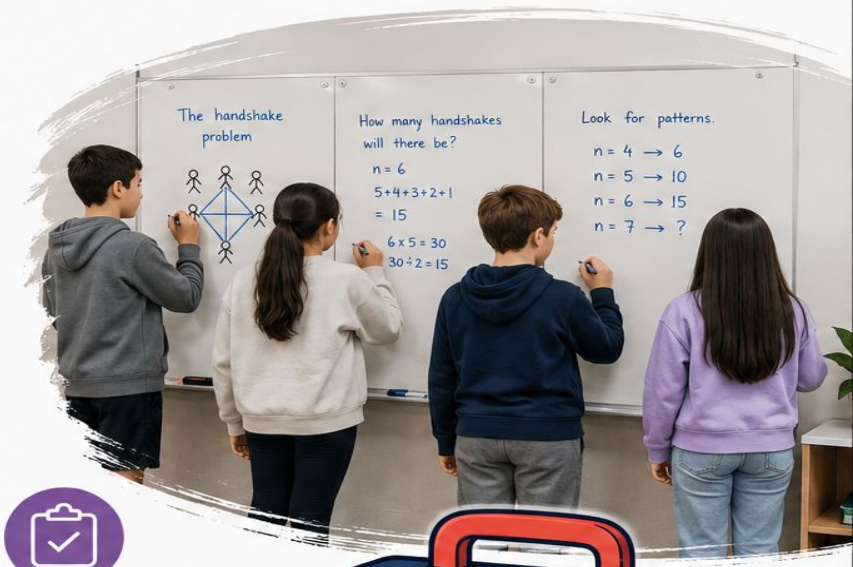
13. Communicate to students where they are and where they are going
14. Grade based on data, not points



Each toolkit builds on the previous one. *One toolkit at a time.*

TOOLKIT 1

Creating the Conditions for Thinking



Toolkit 1 is about creating the conditions where thinking naturally occurs.

These four practices work together.

1

USE THINKING TASKS

Tasks that spark curiosity, require reasoning, and have multiple entry points.

2

FREQUENTLY FORM VISIBLY RANDOM GROUPS

Random groups promote equity, inclusion, and rich mathematical discussions.

3

USE VERTICAL NON-PERMANENT SURFACES

Standing at vertical surfaces keeps all students visible, engaged, and accountable.

12

EVALUATE WHAT YOU VALUE

Our assessment practices should reflect the kinds of thinking we want students to develop.

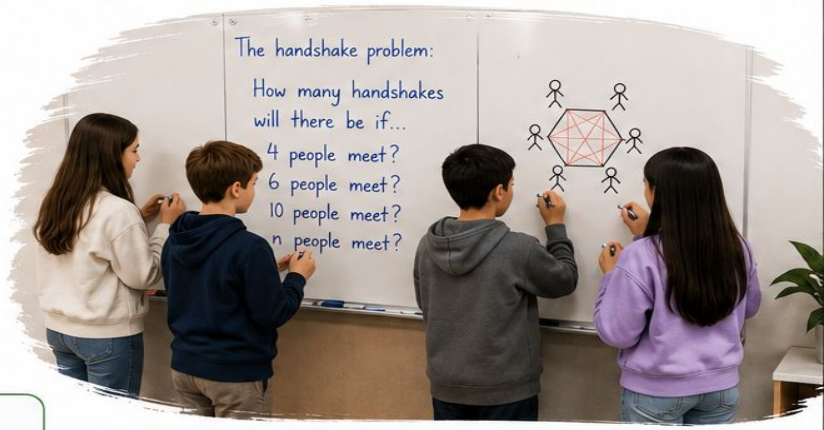


When these four practices are in place, a Thinking Classroom can thrive.

PRACTICE 1

Use Thinking Tasks

We start with the task. A good thinking task sparks curiosity, has multiple entry points, and leads to rich discussion.



ANSWER-GETTING TASKS

One right answer.
Focus on speed or procedures.
Low engagement.

Examples:

- Solve: $7x + 3 = 24$
- Find the area of this rectangle.
- Write the rule for this pattern.

THINKING TASKS

Multiple solutions and strategies.
Require reasoning and justification.
Spark conversations.

Examples:

- The handshake problem
- Which One Doesn't Belong?
- How many triangles do you see?

RESEARCH SAYS...

- Students are more likely to engage in meaningful math.
- Rich tasks build conceptual understanding, not just procedures.
- Discussion > Answers.

THE TAKEAWAY

Great thinking tasks create the need to think.
They are the engine that drives the Thinking Classroom.

TOMORROW'S CHALLENGE

Replace **ONE** task in your lesson with a thinking task.

Start small. Notice the thinking.

START HERE

Don't begin with your curriculum.

> We're not teaching students mathematics first.
>
> *We're teaching them how to think mathematically.*

3–5 NON-CURRICULAR THINKING TASKS

BUILD ROUTINES
Students learn expectations in a low-stakes environment.

BUILD COLLABORATION
Students talk, listen, justify, and build on ideas.

BUILD CONFIDENCE
Everyone develops the mindset that they can be a thinker.

THEN

INTRODUCE CURRICULUM TASKS
Once routines are strong and students are thinking together.

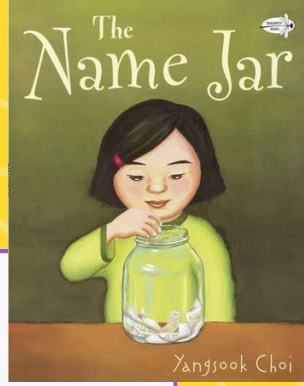
Why start this way?

- **Students learn the routines and expectations** in a low-stakes environment.
- **Everyone builds confidence** as a thinker.
- **Stronger discussions and collaboration** before content increases engagement in rigorous math.
- **Sets the foundation** for a Thinking Classroom that lasts all year.

The goal isn't to teach content yet.
It's to teach students how to think together.



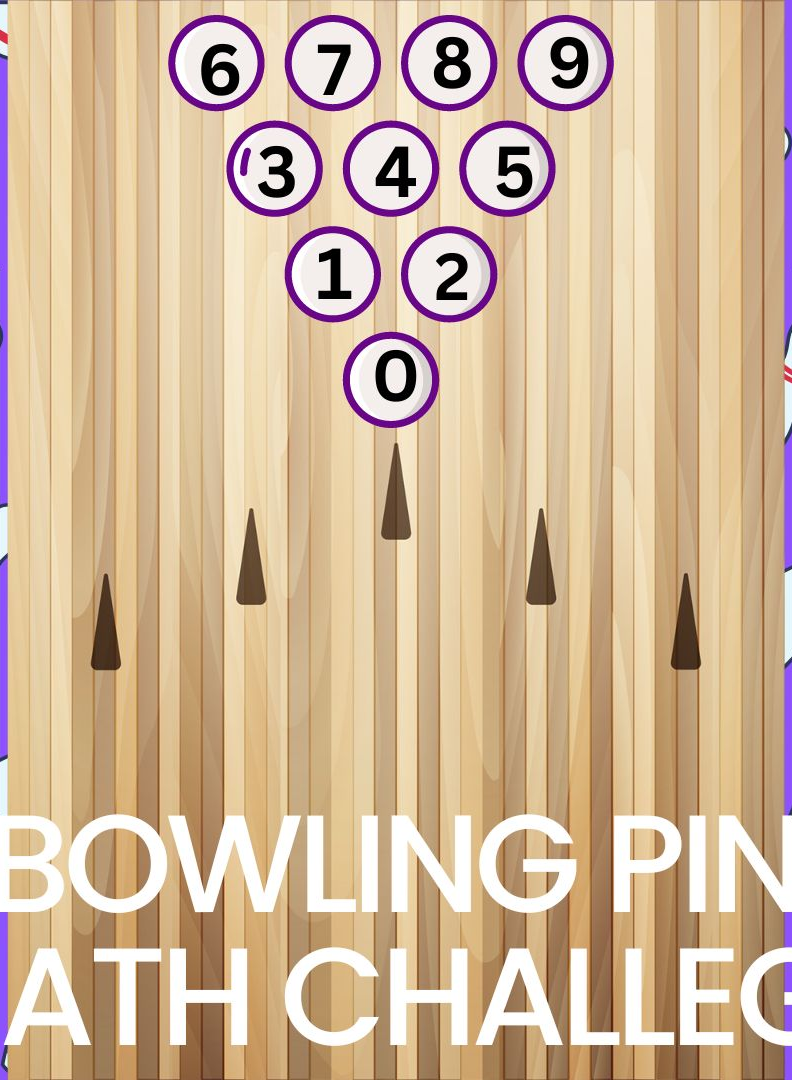
THINKING TASK



If A=1, B=2, C= 3..... Z= 26

Whose name in your group has the highest value?

BOWLING PIN MATH CHALLEGE



Instructions:

Using the three given numbers, create math equations that have the solutions of the different pins. Each of the three numbers has to be used once in the equation. Try and knock all of the pins down to get a strike. Do not forget order of operations! Think outside the box.

For example: If the numbers were 2, 7, 9

You could use (7x2) - 9 =5

Then you would cross the five out

You can use the digits as a numerator or denominator if that helps! Think outside the box.

Three given numbers:

2, 5, 9

Four Aces Card Trick

It is not magic that solves the problem, it is math!
Your task: Figure out how this card trick works and be able to perform it.
You must follow the steps of the trick.
The answer is math! There is no "sleight of hand."



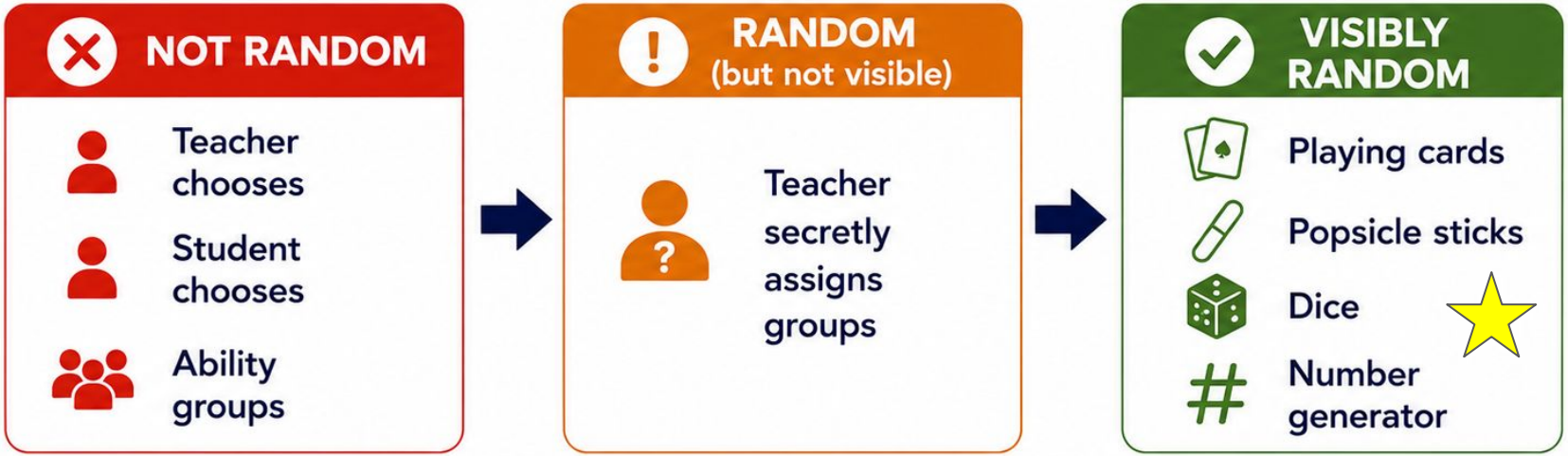




2 PRACTICE 2

Frequently Form Visibly Random Groups

Random isn't the goal. Visible randomness is.



When students believe groups are truly random, status begins to disappear.

2 PRACTICE 2

The Research



Reduces status.

Random groups prevent labels and hierarchies from forming.



Increases mathematical discussion.

Students talk more with more classmates about more math.



Creates equity.

Every student has access to every idea and every peer.



Builds classroom community.

Students learn to work with many different people.

2 PRACTICE 2

Common Teacher Concern

But what if two students can't work together?

That's exactly why they need opportunities to learn how.

Exceptions exist. Safety always comes first.

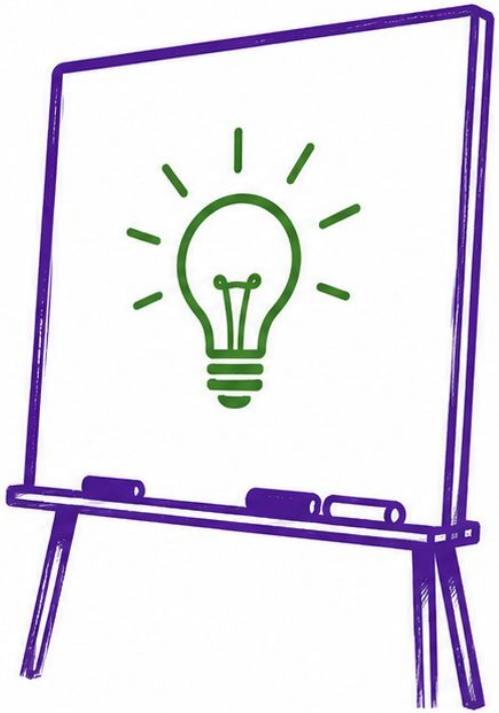
We teach and practice how to work together.

Discomfort doesn't mean inability.

Discomfort ≠ Inability.

3 PRACTICE 3

Use Vertical Non-Permanent Surfaces



Standing changes thinking.

The whiteboard isn't the strategy.
The *thinking* is.

3 PRACTICE 3

Use Vertical Non-Permanent Surfaces

Turn & Talk



How did standing at the whiteboard change your experience during the handshake task?





Take **2 minutes** to discuss with a partner.
Be ready to share out!

3

PRACTICE 3

Use Vertical Non-Permanent Surfaces

What Did You Notice?



Everyone could see.



Easier to talk.



Nobody hid.



Easier to erase.



We all contributed.

3

PRACTICE 3

Use Vertical Non-Permanent Surfaces

Why Non-Permanent?

PERMANENT MARKER



Mistakes stay.

Ideas feel risky.

Less willing to try.

VS.

DRY ERASE MARKER



Mistakes disappear in seconds.

Students become more willing to try ideas.

When mistakes are easy to erase, thinking is easier to try.

3 PRACTICE 3

Use Vertical Non-Permanent Surfaces

VNPS Essentials: Setting Up for Success

A few simple structures make a big difference in student thinking.

1. 3 STUDENTS PER GROUP



- Three maximizes participation.
- Two can divide the work.
- Four can lead to passive students.

Everyone has a voice.
Everyone thinks.

2. 1 WHITEBOARD MARKER PER GROUP (BLACK)



- One writer at a time.
- Encourages discussion before writing.
- The marker naturally rotates.
- Everyone contributes ideas.

More talk. Deeper thinking.
Stronger group work.

3. TEACHER USES A DIFFERENT COLOR



- Allows you to add prompts and questions without erasing thinking.
- Keeps teacher thinking separate from student thinking.
- Preserves evidence of student ideas.

Students see their thinking stay visible and valued.

Why it matters: These structures help create accountable talk, shared responsibility, and clear evidence of student thinking. → *These routines support all the BTC practices!*

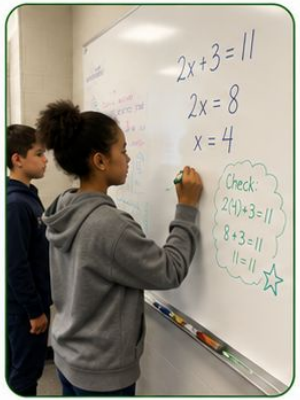
This aligns to the Standards for Mathematical Practice: 1, 3, 4, 6, 7, and 8

3 PRACTICE 3

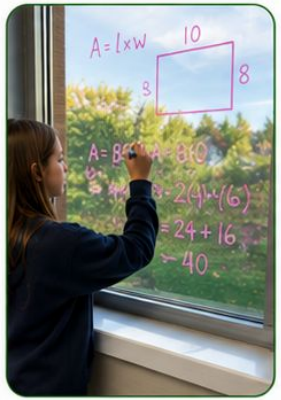
Use Vertical Non-Permanent Surfaces

What Counts as VNPS?

Whiteboards



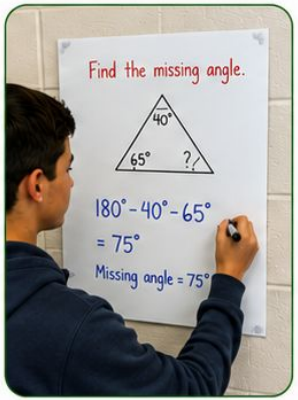
Windows



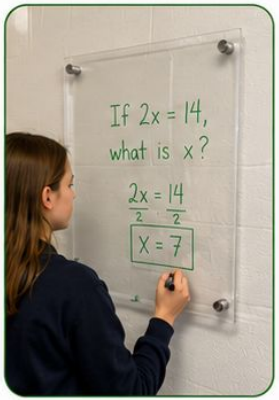
WipeBooks®



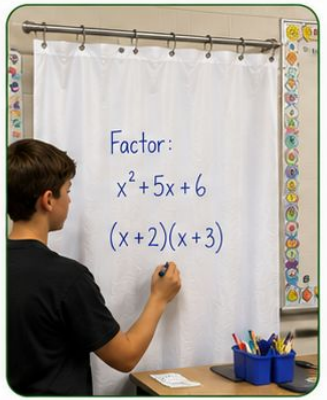
Dry Erase Film



Clear Acrylic



Shower Curtain



Not every classroom has the same surfaces.

Get creative! Use what you have.

12 **PRACTICE 12**
Evaluate What You Value

02:22

Evaluate What You Value



Assess the thinking you want to see.

TURN & TALK

What mathematical behaviors do you want your students to develop?

12

PRACTICE 12

Evaluate What You Value

Why It Matters

Assessment *communicates* what is important.

Students pay attention to *what we assess*—
not just what we *say* we value.

Align assessments and feedback with the
thinking behaviors we want to grow.



Take a moment to reflect:

Are our assessments capturing the thinking we value?

12

PRACTICE 12

Evaluate What You Value

Questions to Consider



- What *mathematical thinking* do we want our students to develop?
- What *evidence* of that thinking are we looking for?
- How do our *assessments and feedback* reinforce those behaviors?

The goal isn't more tests.

It's better information about student thinking.

12

PRACTICE 12

Evaluate What You Value

How to Assess What Matters

Collect evidence of thinking, not just correctness.

1 Record Thinking Behaviors



Look for and note evidence of important mathematical thinking.

Examples of evidence:

- Explained their reasoning
- Tried a second strategy
- Changed their thinking after discussion
- Asked a productive question
- Helped move their group's thinking forward

2 Change Your Feedback



Give feedback that honors and deepens student thinking.

Try saying:

- "Tell me why."
- "What convinced you?"
- "Can you represent it another way?"

3 Observe the Process



Focus on the thinking students are using, not just the answer.

Look for:

- Who is persevering?
- Who is making connections?
- Who is justifying?
- Who changed their thinking?

4 Elevate Ideas During Consolidation



Highlight and build on students' mathematical ideas.

Instead of asking:

"Who got #5?"

Ask instead:

"Which strategy should our class discuss?"

5 Use Purposeful Exit Tickets



Ask questions that reveal and value student thinking.

Try asking:

- "What idea helped your group the most today?"
- "What mistake helped your understanding today?"

This aligns to the Standards for Mathematical Practice

- **1** Make sense of problems and persevere in solving them.
- **3** Construct viable arguments and critique the reasoning of others.
- **4** Model with mathematics.
- **6** Attend to precision.
- **7** Look for and make use of structure.
- **8** Look for and express regularity in repeated reasoning.

When we assess what matters, we communicate what matters.

12

PRACTICE 12

Evaluate What You Value

Bringing It Together

When our *assessments align* with the thinking we value, students *rise* to the challenge.



1. Create the Conditions

Thinking Tasks & Random Groups

2. Make Thinking Visible

Vertical Non-Permanent Surfaces

3. Evaluate What You Value

Assess the thinking that matters

4. Grow Together

Use evidence to inform next steps

Remember:

What we assess shapes what students believe matters.

Let's make sure it communicates the thinking we want to grow.

PAUSE & BREATHE

How are you feeling?

A



B



C



D



02:22

TURN & TALK



- What are you *excited* about?
- One thing that *fascinated* you?
- Any *questions* you have?

Be prepared to share out!

Your BTC Journey

Building Thinking Classrooms is implemented over time—not overnight.

TOOLKIT 1

1–2 WEEKS

Build classroom routines.

- Thinking Tasks
- Visibly Random Groups
- Vertical Non-Permanent Surfaces (VNPS)
- Evaluate What You Value



TOOLKIT 2

2–3 WEEKS

Students become increasingly independent.

- Defront the Classroom
- Answer Only Keep-Thinking Questions
- Launch Early, Standing, and Verbally
- Foster Autonomy
- Flow



TOOLKIT 3

THE REST OF THE SCHOOL YEAR

Continue refining instructional practices.

- Give check-your-understanding questions
- Consolidate from the bottom
- Do note making



TOOLKIT 4

THE REST OF YOUR CAREER

Continue growing and refining your practice.

- Communicate to students where they are and where they are going
- Grade based on data, not points



Remember: **Focus on one toolkit at a time. Success comes from consistency, not speed.**

TOOLKIT 2 Building Student Independence

Once students know the routines, the teacher begins stepping back.



Students become increasingly independent thinkers and problem solvers.

THE FIVE PRACTICES

Chapter 4 | Defront the Classroom
Remove the teacher from the front and place the thinking in the hands of students.

Chapter 5 | Answer Only Keep-Thinking Questions
Respond in ways that keep the thinking going instead of giving answers.

Chapter 6 | Launch Early, Standing, and Verbally
Get students thinking quickly so more of the brain is free for thinking.

Chapter 8 | Foster Autonomy
Create a classroom culture where students make decisions and own their learning.

Chapter 9 | Flow
Design lessons and routines so that the thinking flows from one task to the next.

*The goal shifts from **teacher ownership** to **student ownership.***

TOOLKIT 3 Making Thinking Visible

Students' thinking becomes the focus of instruction.



The teacher gathers evidence of learning without interrupting thinking.

THE THREE PRACTICES

Chapter 7 | Give Check-Your-Understanding Questions

Use questions that help students reflect on their thinking and monitor their own understanding.

Chapter 10 | Consolidate from the Bottom

Invite students to share and build on each other's thinking to consolidate understanding.

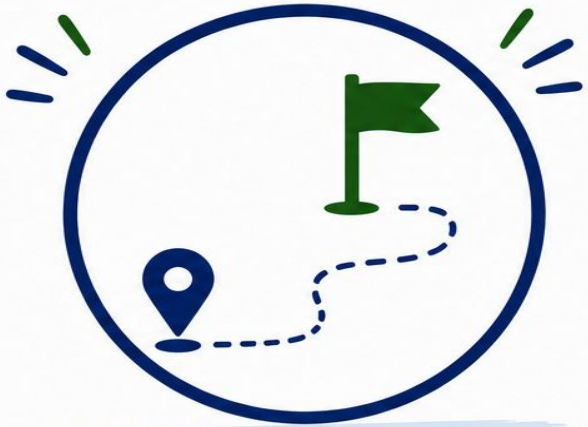
Chapter 11 | Do Note Making

Have students take notes in ways that help them organize and make sense of their learning.

The teacher gathers evidence of learning without interrupting thinking.

TOOLKIT 4 Communicating Learning

Help students understand where they are and where they're going.



Clear communication empowers students to take ownership of their learning.

THE TWO PRACTICES

Chapter 13 | Communicate to Students Where They Are and Where They Are Going

Use clear learning intentions, success criteria, and ongoing feedback so students understand their progress and next steps.

Chapter 14 | Grade Based on Data, Not Points

Base grades on evidence of learning and growth from standards, not on points, percentages, or extra credit.

Learning becomes transparent for both students and teachers.

BUILDING THINKING CLASSROOMS

RESEARCH: @pgliljedahl
SKETCHNOTE: @wheeler_laura

① Begin w/ a Problem

Give a problem-solving task

To start:
Problems should be
- ☐ engaging
- ☐ non-curricular
- ☐ collaborative
- ↳ promote talking

Later:
Problems can be curricular
eg textbook problems

② Visibly Random Groups

- ☐ Randomly assigned eg playing cards
- ☐ Daily & in front of students
- ☐ 2 or 3 students / group



- ☐ Sit & stand together

③ Vertical Non-Permanent Surfaces

- ☐ Vertical
- ☐ Erasable

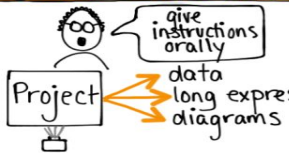






- ☐ 1 marker or chalk per group
  ↳ promotes discussion

④ Oral Instructions



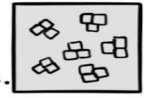
→ groups will discuss (instead of decoding text)

⑤ Defront the room



- orient in various directions
- pull away from wall (room to stand @ VNPS)

Teacher addresses the class from a variety of locations.



⑥ Answering Questions

Acknowledge, but don't answer:

- ✗ Proximity questions (b/c teacher is close by)
- ✗ Stop thinking questions (is this right?)

Answer:

- ✓ Keep thinking questions
  ↳ give HINTS not answers

⑦ Meaningful Notes

Student created:

- select
- synthesize → ideas
- reorganize

Based on their or others' boards

Provide time for this after levelling.



⑧ Build Autonomy

- ☐ Model how groups can visit other groups when they are stuck or done.
- ☐ Hints & extensions come from peers (not just the teacher).

→ Helps manage flow



⑨ Hints & Extensions

↳ Manage flow



⑩ Level to the Bottom

- debrief
- class discussion
- direct teaching
- the "lesson"

Once all groups pass a minimum threshold.

Debrief 1 or more groups' solutions

Work through a new problem w/ whole group

⑪ Check Understanding

Assign 4-6 "check for understanding" questions

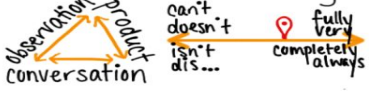
Students choose to work
- individually
- in groups
  - at desks
  - on VNPS

Purpose: self-evaluation (NOT ~~marks~~)

⑫ Formative Assessment

~~measure~~ → communicate
where student is currently ↔ where student is going

Multiple & varied opportunities to demonstrate learning



⑬ Summative Assessment

PROCESS > product

Evaluate what you value!

Include:
group + individual work



⑭ Reporting

Based on data (NOT ~~points~~)

~~One aggregated mark~~
↳ disaggregated evidence

Analysis of data > Counting of points

What has this student learned?

What can they improve?

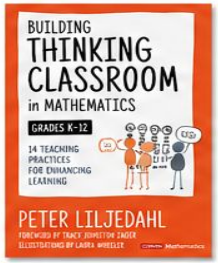
Reminder*
Chapters are now in a different order!

RESOURCES

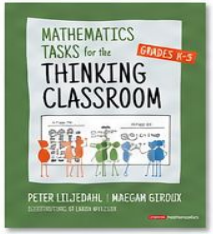
Continue Your BTC Journey

Keep learning. Keep implementing. Keep building thinking classrooms.

READ NEXT



Building Thinking Classrooms in Mathematics (Grades K–12)



Mathematics Tasks for the Thinking Classroom (K–5)

WATCH

- Peter Liljedahl presentations on YouTube
- Corwin Mathematics resources and webinars
- Building Thinking Classrooms (BTC) Facebook Community

START THE FIRST WEEK OF SCHOOL

- ☑ Launch one thinking task each day.
- ☑ Use visibly random groups for every discussion.
- ☑ Have students work at vertical non-permanent surfaces (VNPS).
- ☑ Reflect on what you assess and why.

CONNECT

Let's keep learning together!

Victoria Rodgers
victoriaro@fsusd.org

You have the power to change the thinking in your classroom.

One small step creates big change.

02:22

TURN AND TALK

Talk with a partner about:

ONE IDEA YOU'RE EXCITED TO TRY

ONE QUESTION YOU STILL HAVE

ONE COMMITMENT FOR THE FIRST WEEK OF SCHOOL

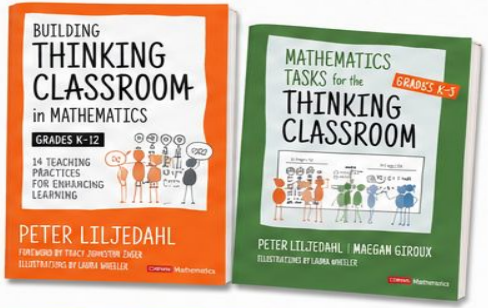
★ *Be prepared to share!* ★

THANK YOU!

Questions?

Victoria Rodgers
KI Jones Elementary

victoriaro@fsusd.org



"Students don't become better thinkers because we tell them to think.
They become better thinkers because we create classrooms where thinking is necessary."
— Peter Liljedahl