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# Building Thinking Classrooms

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# Objectives



By the end of this workshop, participants will be able to:

1. **Gain a comprehensive understanding** of Peter Liljedahl's 14 optimal practices for fostering a Thinking Classroom.
2. **Utilize thinking tasks effectively** to promote critical and creative thinking among students.
3. **Integrate key elements** of the Thinking Classroom framework into their own teaching practices to enhance student engagement and problem-solving skills.

# Rethinking Math Education

IT'S TIME  
TO **RETHINK**  
EVERYTHING



Rethinking Education

# How have students learned in math classroom?

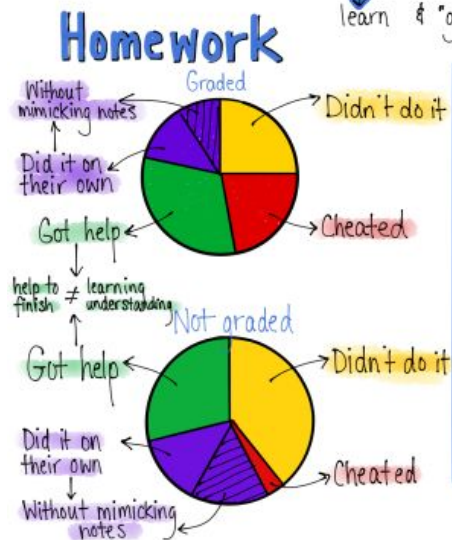
Peter Liljedahl  
Darren Allan  
@Simon Fraser University

## STUDENTING

Behaviours students do to...

learn & "game" the system

Sketchnote  
@wheeler\_laura

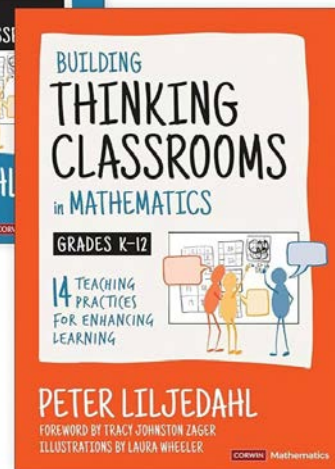
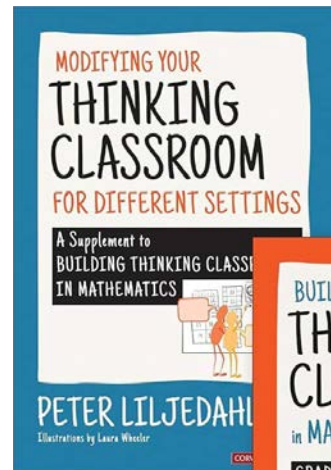


**You try one**

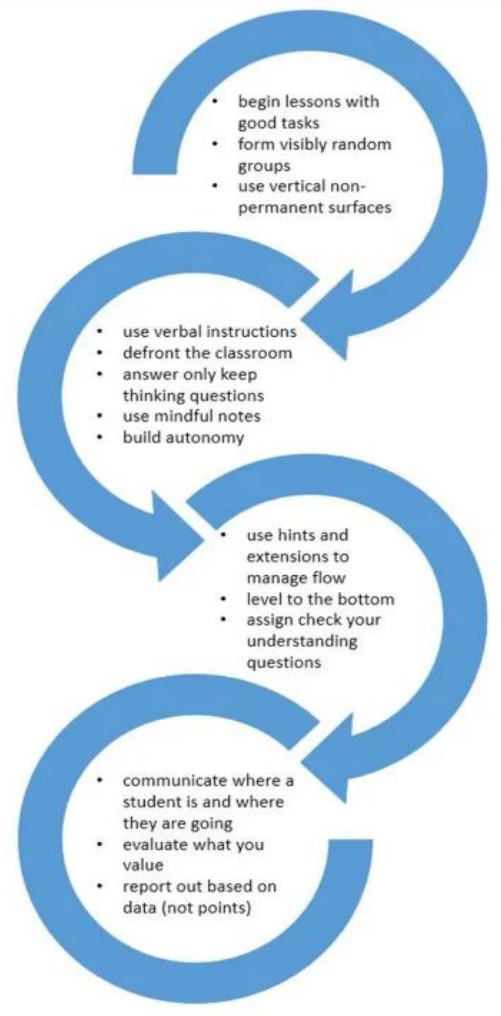
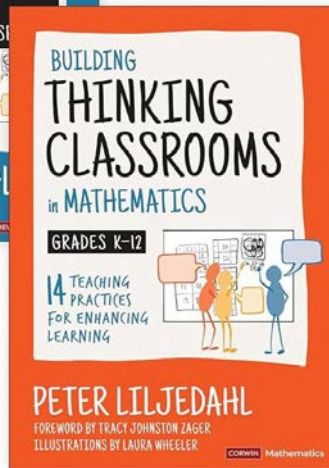
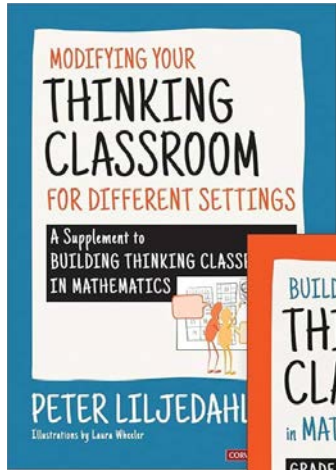
TEACHER direct instruction → worked example → STUDENT now you try one



RESEARCH: @pjliljedahl  
SKETCHNOTE: @wheeler\_laura



# The 14 Practices To Build A Thinking Classroom

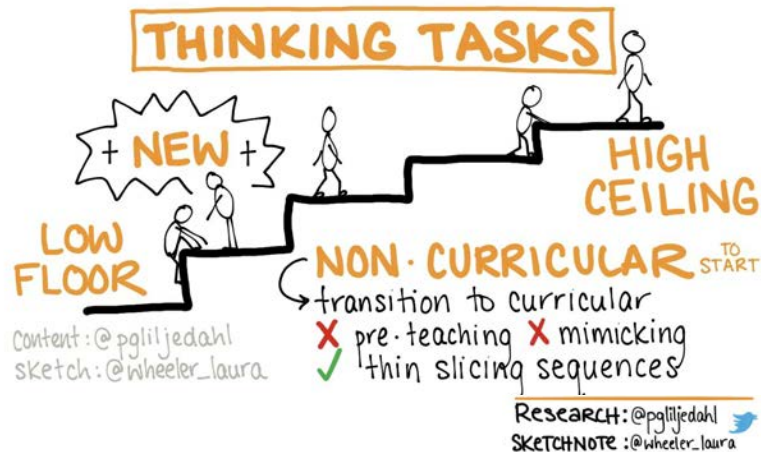


# 14 Practices

1. Start with a thinking task	8. Asynchronous use hints and extensions
2. Frequently from visibly random groups	9. Consolidate from the bottom
3. Use Vertical non-permanent Surfaces	10. Give check your understanding questions
4. Defornt the classroom	11. Have students meaningful notes
5. Answer only thinking questions and keep thinking questions	12. Evaluate what you value
6. Giving thinking tasks early, standing and verbally	13. Help students where they are and where they going
7. Mobilzed knowledge	14. Grade based on data (not point)

# Start with thinking task(s)

1. Verbally, early, and while standing
2. Provide tasks encourage thinking
3. Mathematical tasks but initially non-curricular tasks
4. Move curricular-aligned activities



# Non-curricular math thinking tasks: Examples

Example 1:

Place a **+** or a **-** in each **●** to make **0**.

$$0 = 1 \bullet 2 \bullet 3 \bullet 4$$

How about...?

$$0 = 1 \bullet 2 \bullet 3 \bullet 4 \bullet 5$$

$$0 = 1 \bullet 2 \bullet 3 \bullet \dots \bullet 49 \bullet 50$$

$$0 = 1 \bullet 2 \bullet 3 \bullet \dots \bullet 99 \bullet 100$$

Example 2:

If 6 cats can kill 6 rats in 6 minutes, how many will be needed to kill 100 rats in 50 minutes?

(Lewis Carroll, 1880 excerpted from Liljedahl (2020))

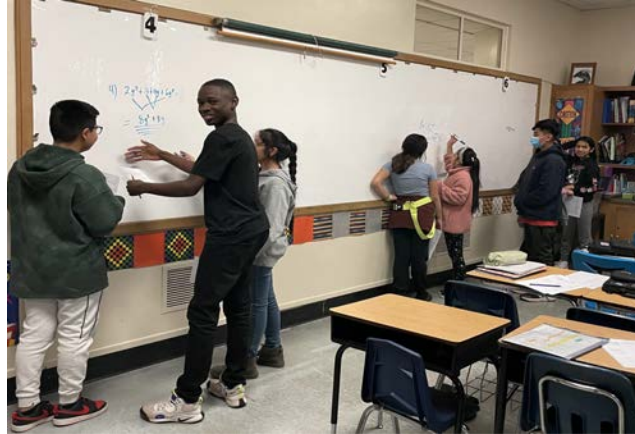


# Whiteboard Moves (Vertical Non-Permanent Surfaces)

1. Random Groups
2. One Marker
3. Record the task
4. Work together
5. Erase with care
6. Gallery Walk



- Collaborate
- Persevere
- Take risks



# How do you move toward a Thinking Classroom?

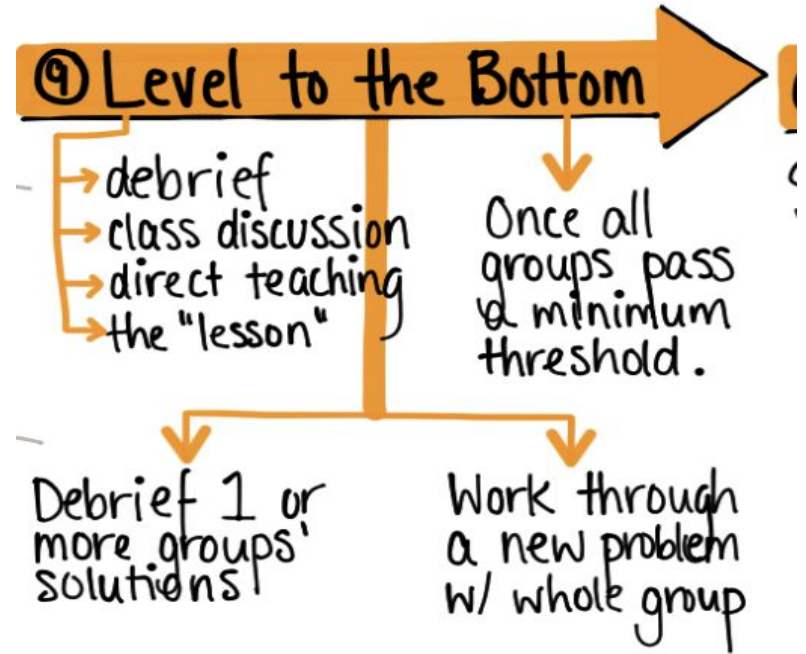
Lesson plan	→	Introduce thinking tasks
Classwork	→	Work on tasks
Notes	→	Use meaningful note
Homework	→	Check your understanding



# Wrap Up and Consolidation

Focus Questions

Students' work

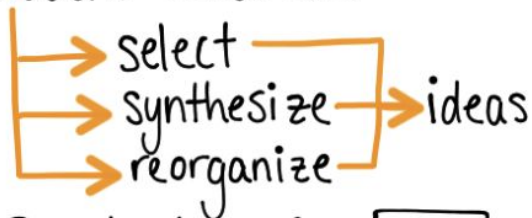


Research: @pglitjedahl  
SKETCHNOTE: @wheeler\_laura

# Meaningful notes (not forgetting things)

## @Student Notes

Student created:



Provide time for this after levelling.



RESEARCH: @pgliljedahl  
 SKETCHNOTE: @wheeler\_laura

**MEANINGFUL NOTES**  
 For my forgetful future self

Task: \_\_\_\_\_

Today I learned ...	Vocabulary I want to remember...
Example 2 ...	Example 1 ...
I shouldn't forget ...	

Notes for Your Future Forgetful Self Name: \_\_\_\_\_

Unit 1: Tools of Geometry

Point	Endpoint	Line
Segment	Ray	Collinear
Parallel	Perpendicular	
Congruent	Bisector/Midpoint	
Geometric Diagram with Proper "Line" Notation		

# Homework - Check Your Understanding Questions

## Tips for CYUQs Success

- Talk about them as opportunities to learn from mistakes (no risks)
- Avoid practice as it suggests mimicking
- Avoid Assignments as it suggest marks
- Provide answer key
- Provide autonomy on whether it is completed- Not for marks
- Provide worked solutions later - after students have tried problems



# Homework-Examples:

1. What is the definition of circumference?
2. What is the definition of diameter?
3. What is the definition of radius?
4. What is the formula for the circumference of a circle?
5. How do you describe the relationship between diameter and radius?
6. How do you describe the relationship between the circumference and diameter of any circle?

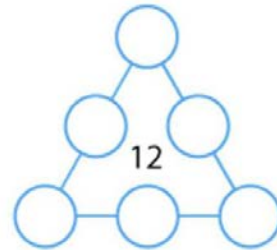
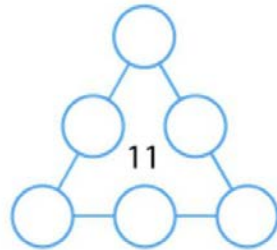
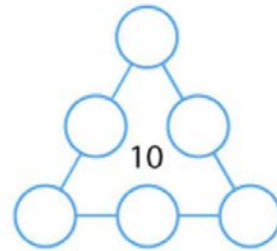
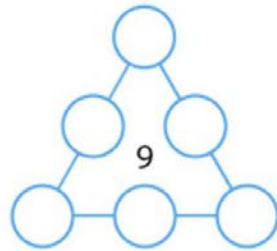
# Practices

- Groups of three
- Stand at the boards
- One marker per group
- Person writing is recording group's thinking
- Use entire board—erase only when necessary
- All group members must be able to explain strategies and reasoning
- Knowledge mobility—feel free to look around and get ideas from other boards

# A Thinking Task

Arrange the numbers 1 to 6 in each set of circles below.

The sum of each side of the triangle equal the number in the center of the triangular shape.





**Plan B: Directions: Using the digits 1 to 9 at most one time each, place a digit in each box to make a true equation**

$$\boxed{\phantom{0}} \frac{\boxed{\phantom{0}}}{8} + \boxed{\phantom{0}} \frac{\boxed{\phantom{0}}}{8} = \boxed{\phantom{0}} \frac{\boxed{\phantom{0}}}{8}$$

# Questions:

- What do you notice?
- What is your thinking?
- Did you see anything unexpected?

# Resources

Random group generator : <https://www.classtools.net/random-group-generator/>

<https://pickerwheel.com/tools/random-team-generator/>

Building thinking classroom:

<https://www.buildingthinkingclassrooms.com/>

Math Curriculum-aligned Thinking tasks:

<https://www.peteriljedahl.com/teachers/numeracy-tasks>

[https://docs.google.com/document/d/1vqdxEiccYJhe8LcDilyNmtImZbsG9Nd\\_jR8TgRFonA/edit](https://docs.google.com/document/d/1vqdxEiccYJhe8LcDilyNmtImZbsG9Nd_jR8TgRFonA/edit)

<https://mathforlove.com/>

Non-curricular thinking math tasks

[Thinking-tasks](#)

<https://peteriljedahl.com/wp-content/uploads/Pruners-Math-Tasks.pdf>

Check your understanding questions:

[Guiding-questions-check-math-understanding](#)

<https://ttaclinklines.pages.wm.edu/open-ended-math-questions-reveal-student-thinking/>

**QUESTIONS**



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