


BUILDING THINKING CLASSROOMS



...back in 2003...

A collage of various classroom scenes is overlaid with a large teal pie chart. The pie chart is divided into two segments: a small 20% segment and a large 80% segment. The 20% segment is labeled '20% of students spent 20% of class time thinking', and the 80% segment is labeled '80% of students spent 0% of class time thinking'. The background photos show students in different states of alertness: some are engaged, some are looking bored, and one is sleeping.

20% of
students
spent 20% of
class time
thinking

80% of
students
spent 0% of
class time
thinking

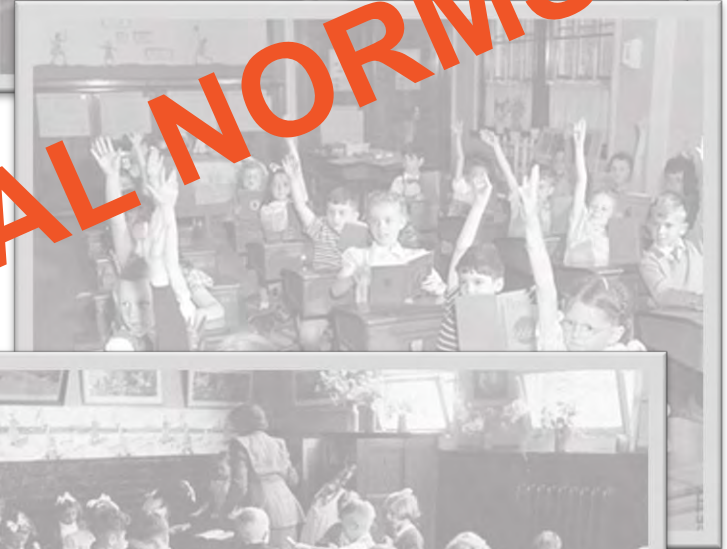








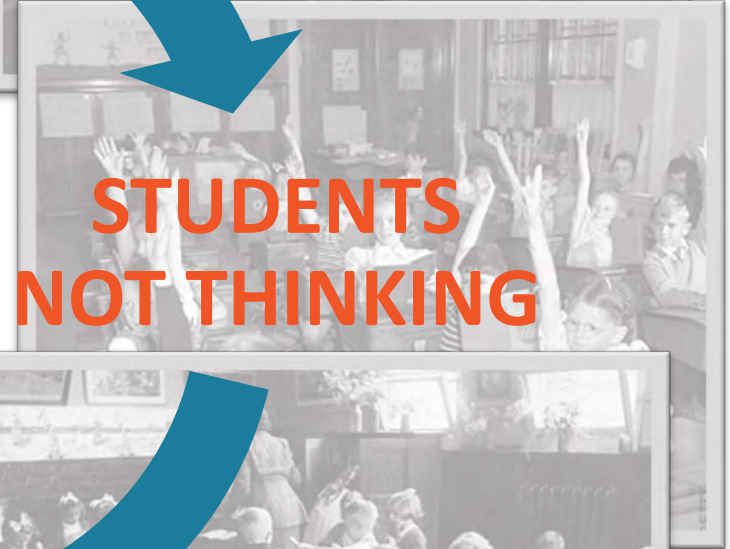




INSTITUTIONAL NORMS



NON-NEGOTIABLE NORMS



**INSTITUTIONAL
NORMS**

**STUDENTS
NOT THINKING**



400+ TEACHERS | 15 YEARS | 2 WEEK CYCLES



RENEGOTIATING THE NON-NEGOTIATED NORMS

400+ TEACHERS | 15 YEARS | 2 WEEK CYCLES

CLASSROOM PRACTICES

1	What are the types of tasks we use?	
2	How we form collaborative groups?	
3	Where students work?	
4	How we arrange the furniture in our classroom?	
5	How we answer questions?	
6	When, where, and how tasks are given?	
7	What homework looks like?	
8	How we foster student autonomy?	
9	How we use hints and extensions?	
10	How we consolidate a lesson?	
11	How we give notes?	
12	What we choose to evaluate?	
13	How we use formative assessment?	
14	How we grade?	

CLASSROOM PRACTICES

OPTIMAL PRACTICES FOR THINKING

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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?	<i>Defront</i> 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 <i>flow</i>
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)

CLASSROOM PRACTICES

OPTIMAL PRACTICES FOR THINKING

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Use thinking tasks

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Form frequent visibly random groupings

3 Where students work?

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Defront the classroom

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Give tasks early, standing, and verbally

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Be intentionally less helpful

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Create and manage *flow*

10 How we consolidate a lesson?

Consolidate from the bottom

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Use meaningful notes

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Evaluate what you value

13 How we use formative assessment?

Communicate to students where they are and where they are going

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Report out based on data (not points)

CLASSROOM PRACTICES

OPTIMAL PRACTICES FOR THINKING

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Report out based on data (points)

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FURTHER PRACTICE

5. Factorize each of the following.
- (a) $2x^2 - 12x + 18$
 - (b) $45m^2 + 60mn + 20n^2$
 - (c) $5 - 125n^2$
 - (d) $x^2y - 22xy + 121y$
 - (e) $72m^2 - 98n^2$
 - (f) $9a^3 - 12a^2b + 4ab^2$
 - (g) $3x^3 - 48x$
 - (h) $18y^2z^2 - 2y^2$



MATH@WORK

7. Harry has $(9x^2 + 24xy + 16y^2)$ marbles, where x and y are positive integers. He arranges the marbles as a square array.
- (a) Express, in terms of x and y , the number of marbles on each side of the array.
 - (b) When $x = 2$ and $y = 5$, find the number of marbles on a side of the array.



BRAIN WORKS

8. Factorize each of the following.
- (a) $y^4 - 81$
 - (b) $z^4 - 625$
9. (a) Expand $(a + b + c)^2$.
(b) Factorize $a^2 + 4b^2 + c^2 - 4ab - 4bc + 2ac$.
(c) Let $E = a^2 + 4b^2 + c^2 - 4ab - 4bc + 2ac$.
(i) What is the minimum value of E ?
(ii) Find two possible sets of values of a , b , and c such that the value of E is the minimum.
10. Alex was asked to factorize $x^2y^2 + 36 - 4x^2 - 9y^2$. He tried some ways of grouping terms as shown below.
- $$x^2y^2 + 36 - 4x^2 - 9y^2 = (x^2y^2 + 36) - (4x^2 + 9y^2)$$
- $$x^2y^2 + 36 - 4x^2 - 9y^2 = (x^2y^2 + 36 - 4x^2) - 9y^2$$
- $$x^2y^2 + 36 - 4x^2 - 9y^2 = x^2y^2 + (36 - 4x^2 - 9y^2)$$
- As he could not carry out factorization with the above groupings, he concluded that the expression could not be factorized. Do you agree with him? Why or why not?

CLASSROOM PRACTICES

OPTIMAL PRACTICES FOR THINKING

1 What are the types of tasks we use?

2 How we assess?

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10 H

11 H

12 W

13 How we assess?

14 How we grade?

How we assess?

**DIVERSITY IS A
STRENGTH**

Communicate to students where they are and where they are going

Report out based on data (not points)

CLASSROOM PRACTICES

OPTIMAL PRACTICES FOR THINKING

1

Use thinking tasks

2

3

4

5



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)

CLASSROOM PRACTICES

OPTIMAL PRACTICES FOR THINKING

BUILDING THINKING CLASSROOMS in MATHEMATICS

GRADES K-12

14 TEACHING
PRACTICES
FOR ENHANCING
LEARNING



PETER LILJEDAHL

FOREWORD BY TRACY JOHNSTON ZAGER
ILLUSTRATIONS BY LAURA WHEELER

CORWIN Mathematics

Use thinking tasks

Form frequent visibly random groupings

Use vertical non-permanent surfaces

Defront the classroom

Only answer keep thinking questions

Give tasks early, standing, and verbally

Give check your understanding questions

Be intentionally less helpful

Create and manage *flow*

Consolidate from the bottom

Use meaningful notes

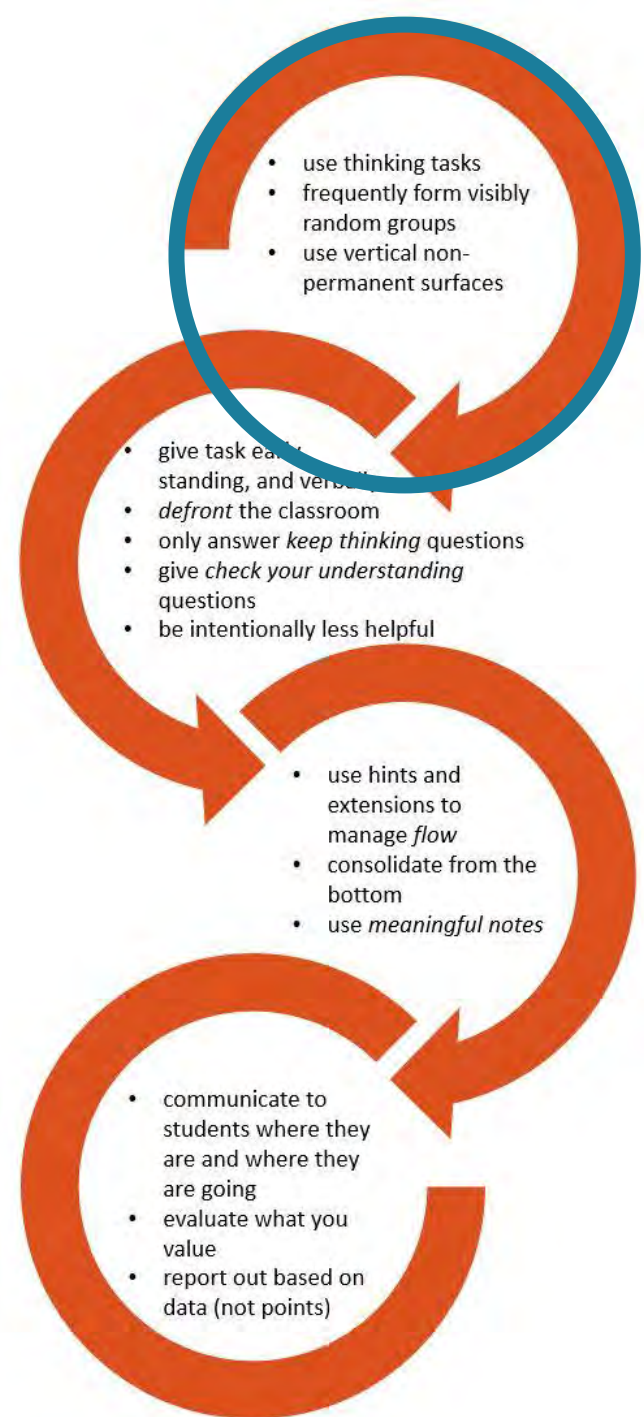
Evaluate what you value

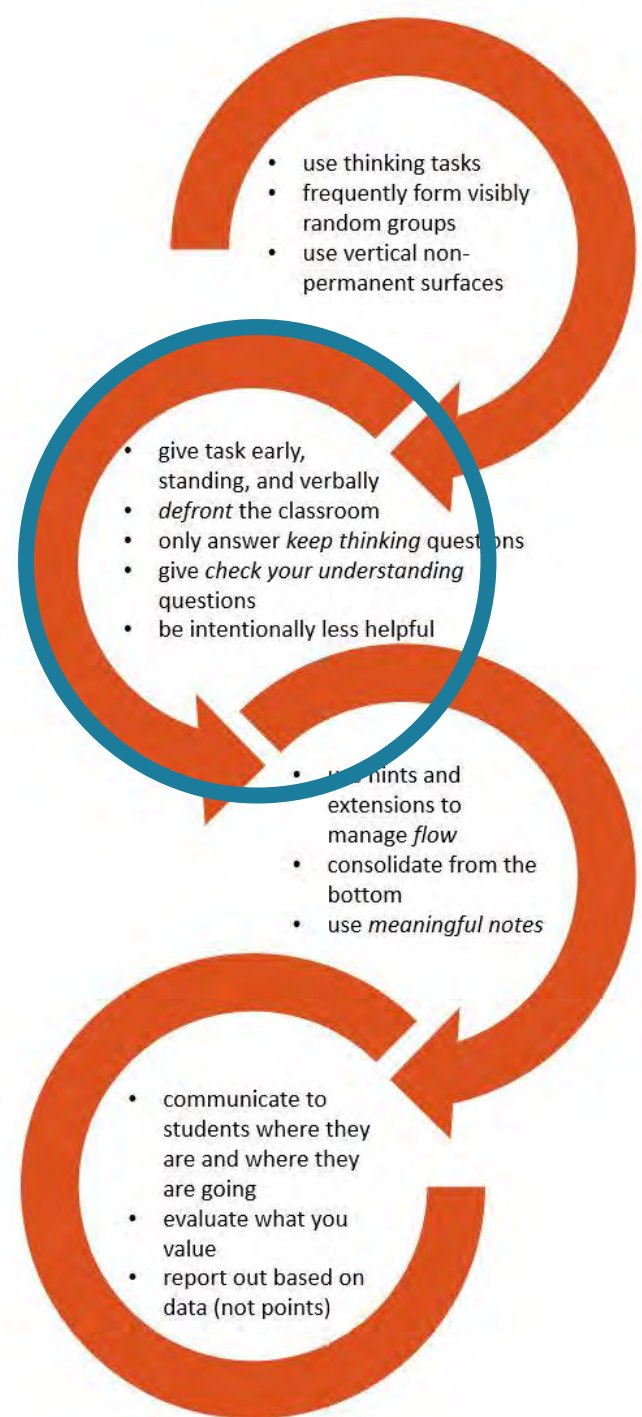
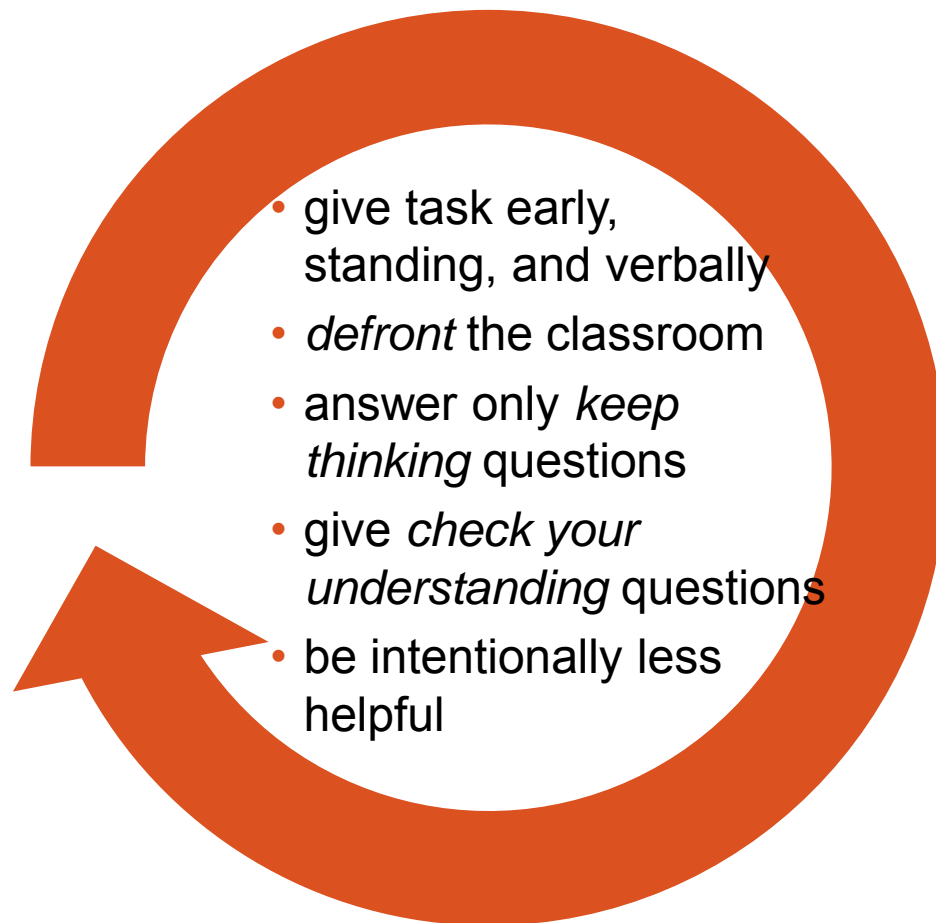
Communicate to students where they are and where they are going

Report out based on data (not points)

WHERE TO START?

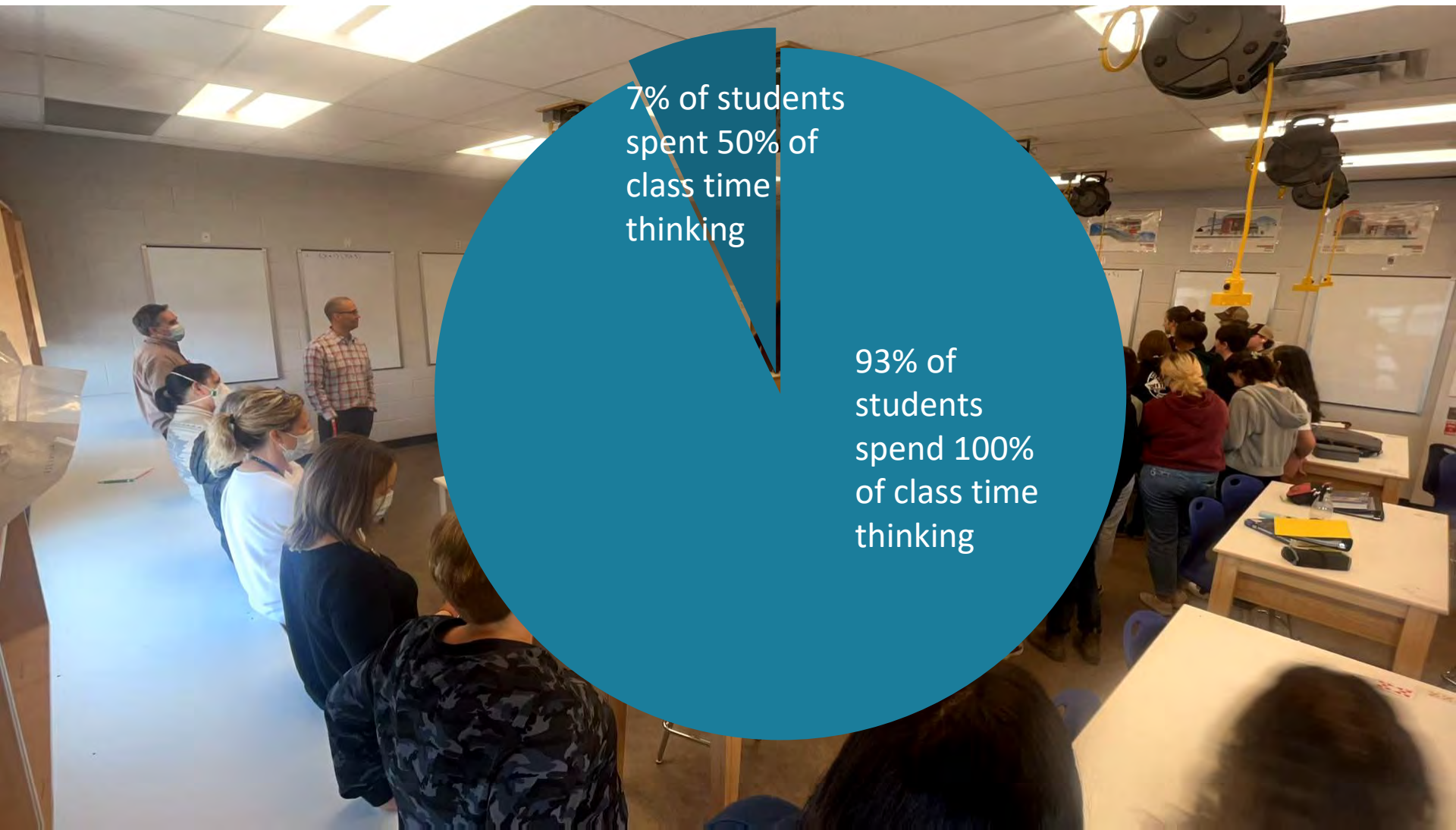






BUILDING THINKING CLASSROOMS





7% of students
spent 50% of
class time
thinking

93% of
students
spend 100%
of class time
thinking



THANK YOU!



@pgliljedahl | #thinkingclassroom



Building Thinking Classrooms



[www. buildingthinkingclassrooms.com](http://www.buildingthinkingclassrooms.com)



<https://bit.ly/3qYGtDU>



BUILDING
**THINKING
CLASSROOMS**
in MATHEMATICS

GRADES K-12

14 TEACHING
PRACTICES
FOR ENHANCING
LEARNING



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FOREWORD BY TRACY JOHNSTON ZAGER
ILLUSTRATIONS BY LAURA WHEELER

CORWIN Mathematics

MODIFYING YOUR
**THINKING
CLASSROOM**
FOR DIFFERENT SETTINGS

A Supplement to
BUILDING THINKING CLASSROOMS
IN MATHEMATICS



PETER LILJEDAHL

Illustrations by Laura Wheeler

CORWIN Mathematics

A thinking
student is
an engaged
student

CM20 for 20% off

CORWIN Mathematics