Changing It Up: Moving Beyond Tradition

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BIG IDEAS LEARNING®

How did you learn math?

Apply mathematics only after
skills are mastered.

All students have a range of strategies and approaches from which to choose in solving problems.

rough exploring
l and
mathematical problems.

Practice procedures and memorize basic number combinations.

What skills will our students need to be productive adults in the future?

How would we now need to learn mathematics?

Beliefs about teaching and learning mathematics	
Unproductive beliefs	**Productive beliefs**
Mathematics learning should focus on practicing procedures and memorizing basic number combinations.	Mathematics learning should focus on developing understanding of concepts and procedures through problem solving, reasoning, and discourse.
Students need only to learn and use the same standard computational algorithms and the same prescribed methods to solve algebraic problems.	All students need to have a range of strategies and approaches from which to choose in solving problems, including, but not limited to, general methods, standard algorithms, and procedures.
Students can learn to apply mathematics only after they have mastered the basic skills.	Students can learn mathematics through exploring and solving contextual and mathematical problems.
The role of the teacher is to tell students exactly what definitions, formulas, and rules they should know and demonstrate how to use this information to solve mathematics problems.	The role of the teacher is to engage students in tasks that promote reasoning and problem solving and facilitate discourse that moves students toward shared understanding of mathematics.
The role of the student is to memorize information that is presented and then use it to solve routine problems on homework, quizzes, and tests.	The role of the student is to be actively involved in making sense of mathematics tasks by using varied strategies and representations, justifying solutions, making connections to prior knowledge or familiar contexts and experiences, and considering the reasoning of others.
An effective teacher makes the mathematics easy for students by guiding them step by step through problem solving to ensure that they are not frustrated or confused.	An effective teacher provides students with appropriate challenge, encourages perseverance in solving problems, and supports productive struggle in learning mathematics.

Stimulating Teacher Reflection & Conversation

Talking Points Routine

Round 1: State whether you agree, disagree, or are unsure. Give your reason WHY. Everyone goes in turn with no discussion.

Round 2: After listening to what others say, state whether you agree, disagree, or are unsure. Include some of what you heard as you talk about WHY.

Round 3: Tally the opinions in your group.

Agree, Disagree, Not Sure	Round 1 (me)	Round 2 (me)	Round 3 (Final Group Tally)
Statement 1:			
Statement 2:			
Statement 3:			

Statement #1

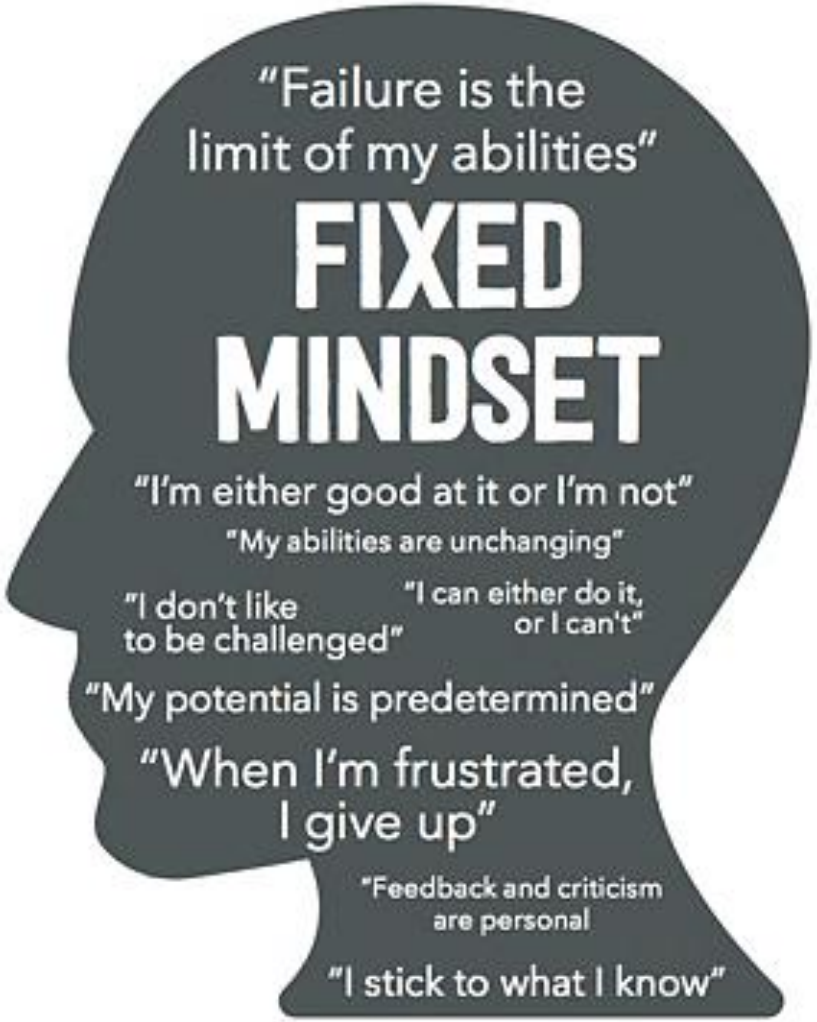
A square is sometimes a rhombus.

Statement #2

Being good at math means being able to do math problems quickly.

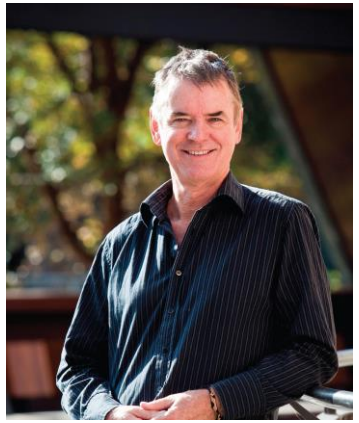
Statement #3

Some students are "math-minded" and some are not.

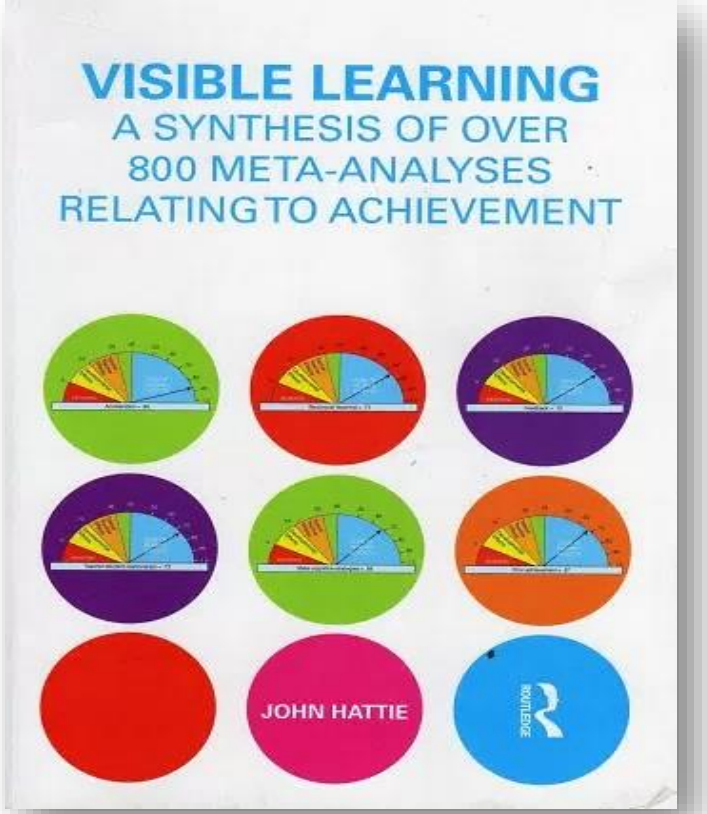


Dr. Carol Dweck

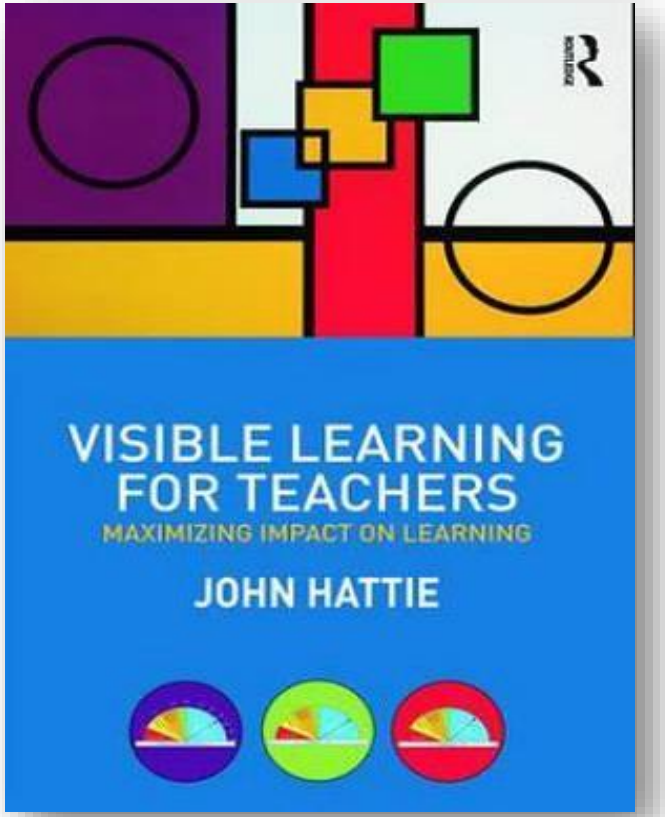
Visible Learning is a suggested approach to teaching in a way that incorporates many of the significant drivers of achievement.



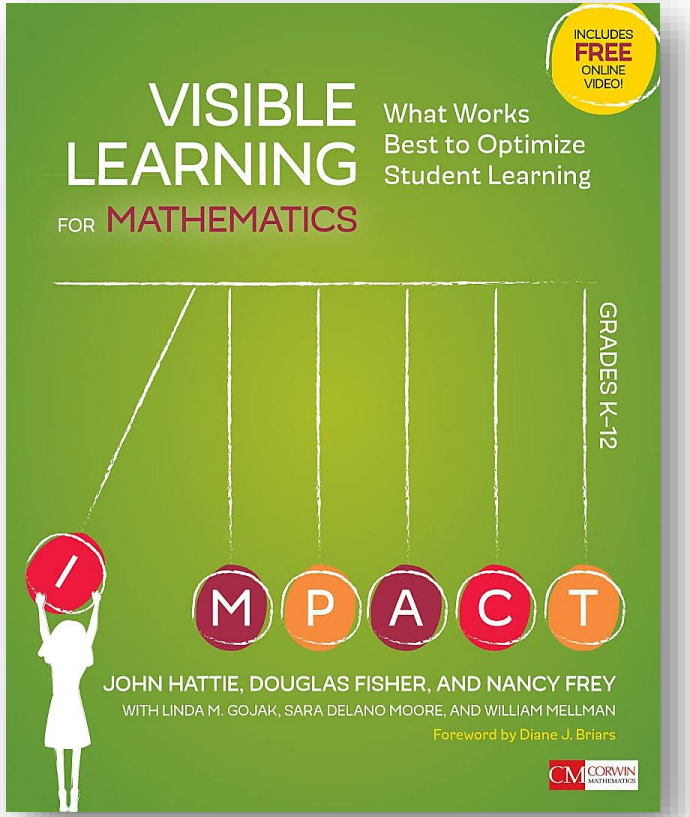
Dr. John Hattie



2008



2012



2016

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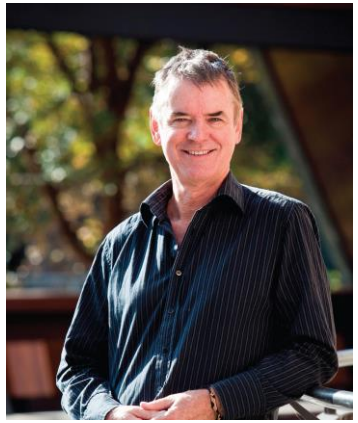


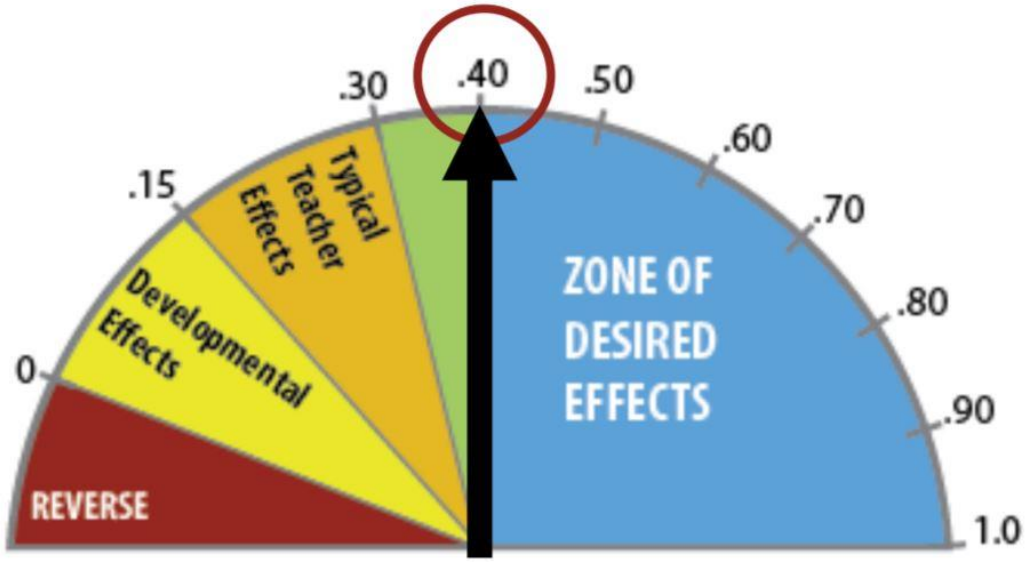
Dr. John Hattie

An Influence is an instructional strategy, idea, or tool we use in schools.

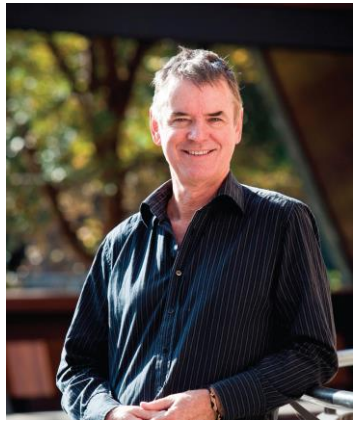
Effect Size represents the magnitude of the impact that a given approach has

The Research

Hattie's Barometer of Influence is based on a "hinge point" of .40 which equals approximately 1 year's worth of growth.



Effect size is a method of comparing results on different measures (standardized tests, teacher tests, student work) over time or between groups that allows multiple comparisons.



Dr. John Hattie

Know thy impact!

From: https://visible-learning.org

Influences on Achievement

Self-reported grades (1.33)

Classroom discussion (0.82)

Reciprocal teaching (0.74)

Concept mapping (0.64)

Spaced vs mass practice (0.60)

Matching teaching with student learning styles (0.23)

Ability grouping (0.12)

Retention (-0.17)

The Research

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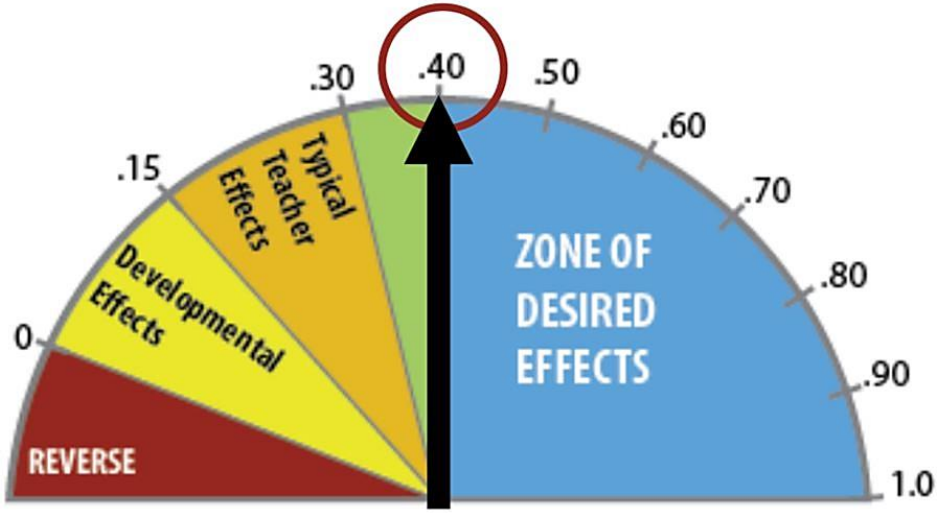


From: https://visible-learning.org

Surface learning phase: Through carefully constructed experiences, students explore new concepts and make connections to procedural skills and vocabulary that give shape to developing conceptual understandings.

Deep learning phase: Through the solving of rich high-cognitive tasks and rigorous discussion, students make connections among conceptual ideas, form mathematical generalizations, and apply and practice procedural skills with fluency.

Transfer phase: When students can independently think through more complex mathematics, and can plan, investigate, and elaborate as they apply what they know to new mathematical situations.

From: https://visible-learning.org

How can I engage kids in mathematics?

Change It Up

Exploring Mathematical Relationships using Manipulatives

Collaboration & Exploration

Name _____ Date _____

MS Adding Integers

Essential Question Is the sum of two integers *positive*, *negative*, or zero? How can you tell?

1 ACTIVITY: Adding Integers with the Same Sign

Work with a partner. Draw a picture to show how you use integer counters to find $-4 + (-3)$.

$-4 + (-3) =$ _____

2 ACTIVITY: Adding Integers with Different Signs

Work with a partner. Draw a picture to show how you use integer count

Name _____ Date _____

Algebra Adding and Subtracting Polynomials

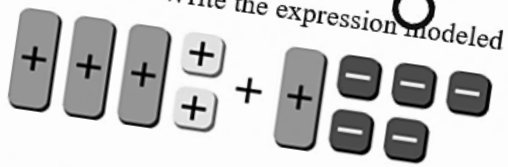
Essential Question How can you add and subtract polynomials?

1 EXPLORATION: Adding Polynomials

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner. Write the expression modeled by the algebra tiles in each step.

Step 1



Step 2

$(3x + 2) + (x - 5)$

Step 3

_____

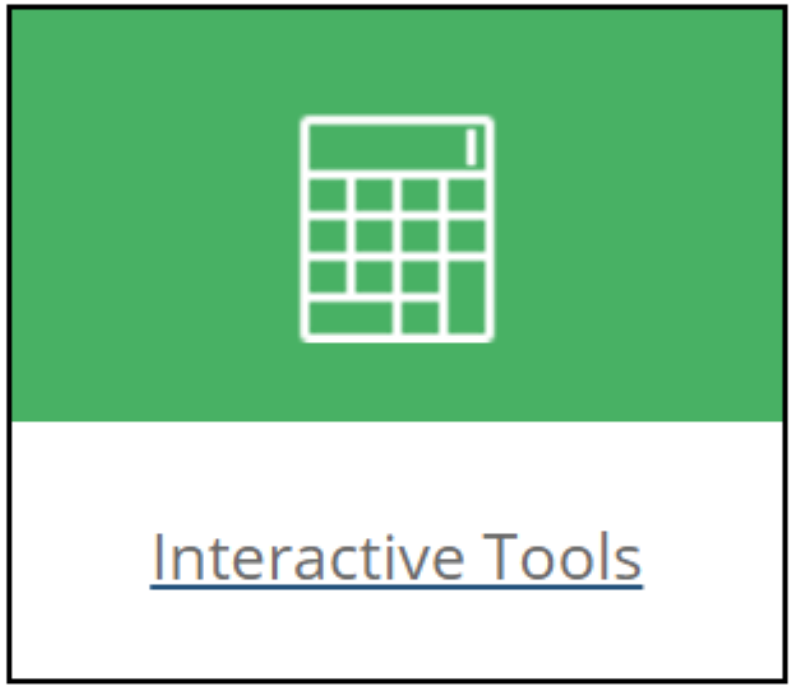
Step 4

_____

2 EXPLORATION: Sub

_____

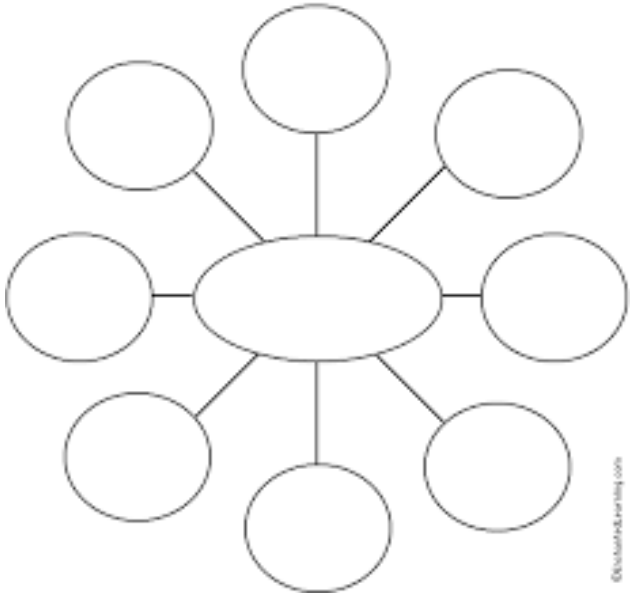
Technology Support

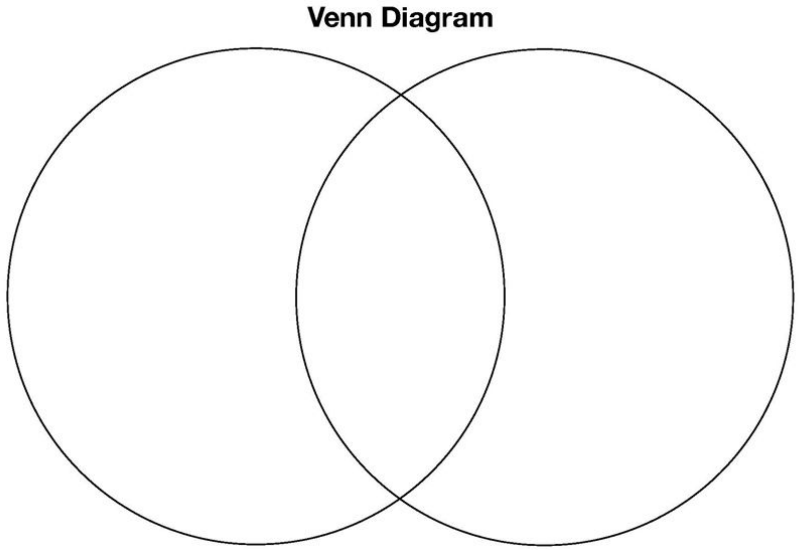


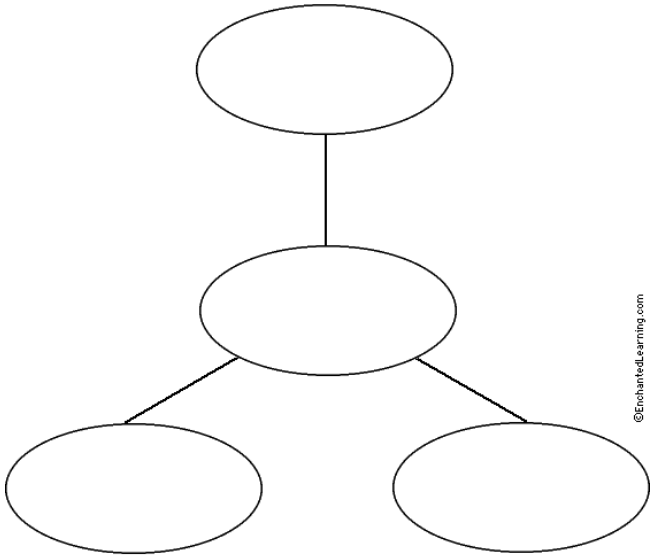
VA Mathematical Process Goals

- Mathematical Problem Solving
- Mathematical Communication
- Mathematical Reasoning
- Mathematical Connections
- Mathematical Representations

Exploring Mathematical Relationships using Graphic Organizers







Solve	Solve pictorially
Solve using number lines	Create a real-life problem

75% of 20

Changing It Up

Moving Beyond Tradition

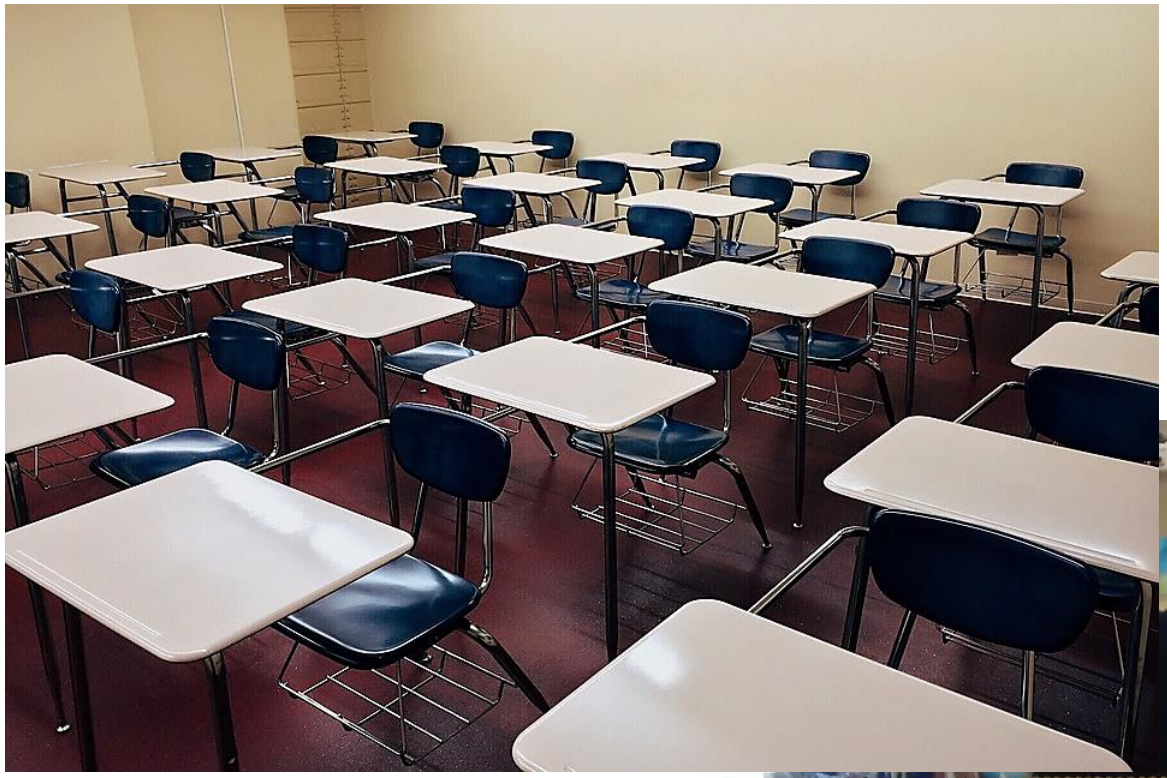
Teacher Role: Active Facilitator

- Ask questions to encourage and stimulate student thinking and reasoning,
- Assess progress of each student as they work toward a solution,
- Provoke cognitive challenges,
- Offer space for students to think, share, discuss, make decisions, and come up with sound arguments and plausible solutions,
- Strike an appropriate balance between the challenge and the learning assistance provided.

Practice Cards

Different colors are different DOK problems. Students pick from different colors to make their “own” practice set.

Δ Normal



Two Nice Things
TYPES OF ERRORS

Desmos

Students take picture of “concept” with phone and use in Desmos graphing program.

Thank You!

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