



The Importance of the Right Task



origoeducation.com

Making Learning Visible

CRA
K3B Subtraction
Representation
Name: _____ Date: 3-24-17

Seven birds are sitting on the fence.
Two birds fly away. How many birds are left?



CRA
K3B Subtraction
Abstract
Name: _____ Date: 3-24-17

Ten birds are sitting on the fence. Five birds fly away. How many birds are left?

$$10 - 5 = 5$$

Visible Learning

1500 meta-analyses

90,000 studies

> 300 million students

Meta-analysis looks for patterns & trends across multiple research studies

Effect size

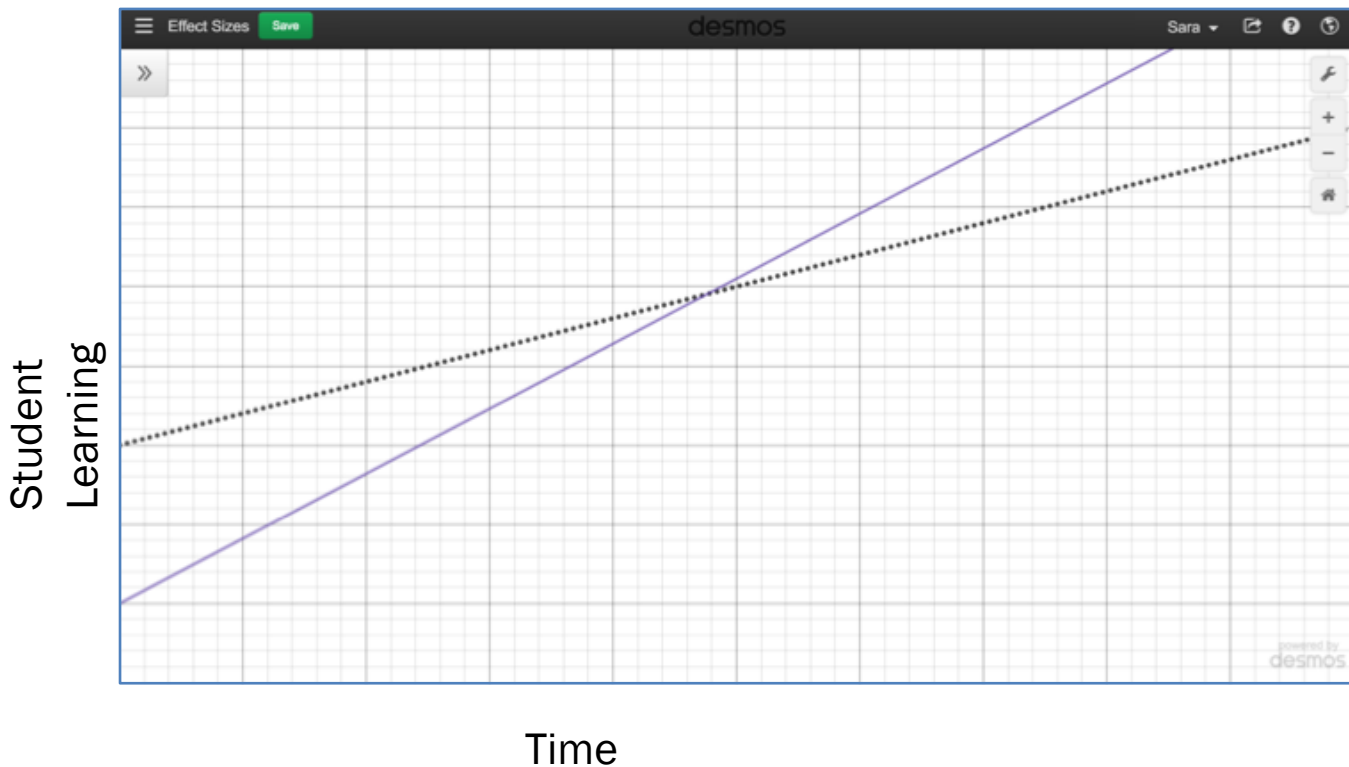
- the magnitude of the impact of a given approach or intervention

Hinge Point (0.40 effect size)

- represents gain beyond the typical growth of one year in school

Choose the things that have more likelihood of a higher effect

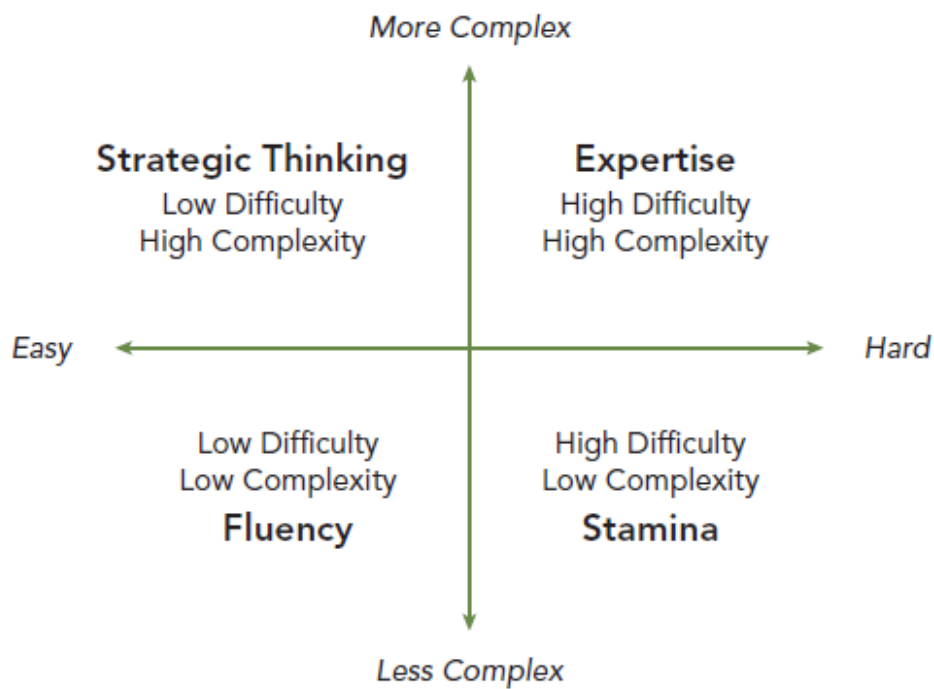
- When done at the right time and with fidelity



What does this mean in the classroom?

- We only get these effects if we use the strategy with fidelity at the right time.
- Key element of this is task selection – choosing the right task for the job.

How do we differentiate?



Surface Learning

Initiation to new ideas

Begins with development of conceptual understanding

Followed by associated procedural skills

What did you notice?

How does this connect to our model?

What would happen next?

What is this called?

How can I write this?

What does this symbol represent?

Thousands	Hundreds	Tens	Ones	tenths	hundredths	

- What do you know about the places in this table?
- What happens if I move the one to the column just to the right?

Deep Learning

Consolidating understanding of concepts and procedures

Making connections among ideas

Two friends are playing a game. They each pick up a card and then compare the decimal fraction they chose. The decimal fraction on Sheree's card has two decimal places. The decimal fraction on Oscar's card has only one decimal place. Oscar thinks he holds the greater decimal fraction. Is this possible?

ORIGO Stepping Stones • Grade 5

© ORIGO Education

Transfer Learning

Apply learning to new situations

Think metacognitively.

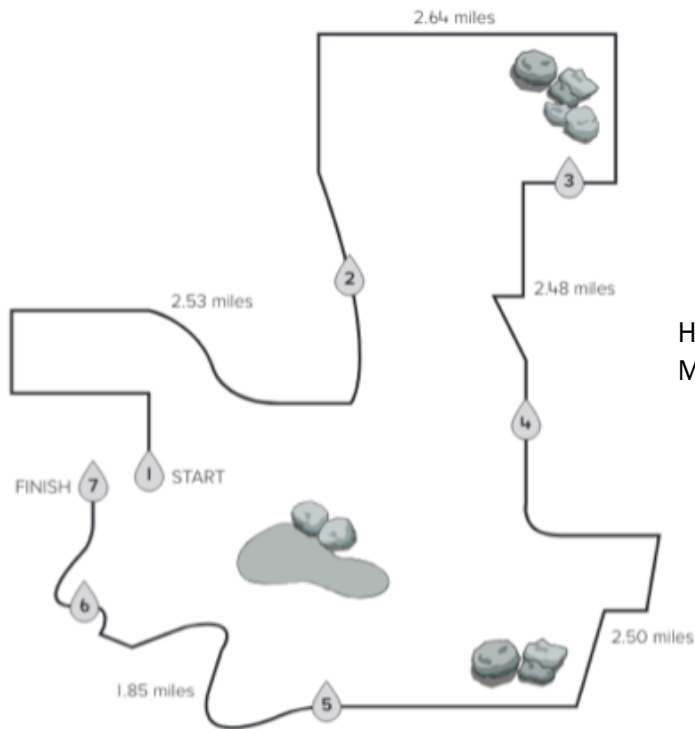
- Self-questioning
- Self-reflection

Written discourse

Near and far transfer

Grade 5 Thinking Task

- The Grade 5 Leadership Team has volunteered to help at their city's Annual Marathon.
- They will prepare coolers of energy drinks for the water stops on the 13.1 mile Half Marathon course and sell homemade energy bars at the finish line.



Here is the Course Map for the Half Marathon with the water stops marked.

Apple Pie Granola Bar Recipe

1 batch: 20 bars

Prep time: 25 minutes

Cook time: 10 minutes

Ingredients

2 cups oats

$\frac{1}{2}$ cup shredded, unsweetened coconut

$\frac{1}{2}$ cup pecans, chopped

$\frac{1}{3}$ cup dates

$\frac{1}{4}$ cup coconut oil

1 teaspoon vanilla

$\frac{1}{3}$ cup honey

1 tablespoon cinnamon

$\frac{1}{2}$ teaspoon nutmeg

1 cup dried apples, chopped

Fig and Walnut Bars Recipe

1 batch: 12 two-inch bars

Prep time: 20 minutes

Cook time: 40 minutes

Ingredients

$1\frac{1}{2}$ cups raw walnuts, chopped

$\frac{1}{3}$ cup whole-grain flour

$\frac{1}{8}$ teaspoon baking soda

$\frac{1}{8}$ teaspoon baking powder

$\frac{1}{4}$ teaspoon sea salt

$\frac{1}{2}$ teaspoon cinnamon

$\frac{1}{3}$ cup light brown sugar

$\frac{1}{2}$ cup dried cranberries

1 cup dried Turkish figs, quartered

1 cup dried apricots, chopped

1 large egg

1 teaspoon pure vanilla extract

Use the **Course Map** to solve.

- There was a problem with the printer and the course maps were printed without the distance between water stops 6 and 7. How far is the last section of the Half Marathon? Show your thinking.

Use the **Course Map** to solve.

- The Marathon organizers will purchase energy powder. The Leadership Team will prepare a 10 gallon cooler of energy drink for each water stop. One three-pound tub of energy drink powder makes 24 quarts and costs \$8.50. How many tubs will they have to buy and how much will it cost?

To answer this question, include:

- The number of energy drink tubs they will need to buy.
- How much all of the tubs will cost.

- Many of the ingredients for both the 16 batches of **Apple Pie Granola Bars** and the 20 batches of **Fig Walnut Energy Bars** are donated by the PTA, **except** for the nuts and dried fruits. Families contribute what they have at home. Students make a list of what was donated.

How much more will they have to buy to make the multiple batches of energy bars?

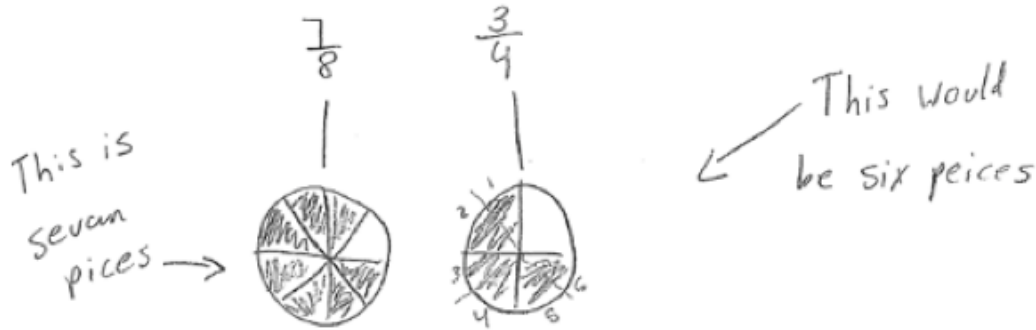
For this question:

- Fill in the **Ingredients Needed** column of the table for all of the ingredients listed.

Recipe	Ingredient Donated	Quantity Donated (in cups)	Ingredients Needed (in cups)
Fig Walnut Energy Bar	Walnuts	10 cups	
	Cranberries	$5 \frac{1}{2}$ cups	
	Figs	$7 \frac{3}{4}$ cups	
	Apricots	9 cups	
Apple Pie Granola Bar	Coconut	$2 \frac{1}{4}$ cups	
	Pecans	$5 \frac{3}{4}$ cups	
	Dates	$3 \frac{1}{3}$ cups	
	Dried Apples	$12 \frac{1}{4}$ cups	

Abstract

Sheliah thinks that $\frac{7}{8}$ is greater than $\frac{3}{4}$. Peter says that $\frac{7}{8}$ is less than $\frac{3}{4}$. Who is correct and why? Use numbers and symbols to thoroughly explain your answer.



Peter is wrong because $\frac{7}{8}$ is more than $\frac{3}{4}$
Sheliah is correct because $\frac{7}{8}$ is more than $\frac{3}{4}$

Sheliah

Peter

~~##~~ = correct

Pictorial

$$\begin{aligned} &\rightarrow \frac{15}{3} \\ &\rightarrow 5 \end{aligned}$$

$$\frac{15}{3} \stackrel{P}{=} 5$$

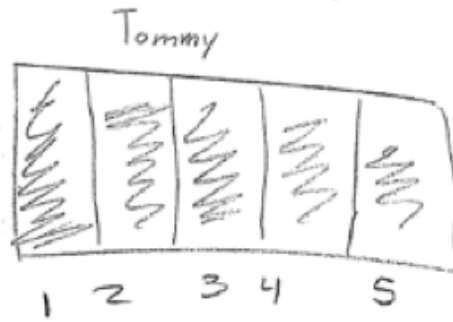
$$\frac{15}{3} = 5 \text{ is greater}$$



Beau says that $15/3$ is equivalent to 5.
Tommy says that $15/3$ is greater than 5.
Who is correct and why? Use representations to demonstrate and explain your answer.



Tommy
Beau



Because 15 is bigger than 5.

Use the information from the Recipes and Question 4 to solve.

After the Marathon $\frac{1}{4}$ of the Apple Pie Granola Bars and the Fig and Walnut Bars were left. Students calculated how many bars were sold and how much money they made. They charged \$0.50 for each bar.

Cody predicted that after buying the fruits and nuts, they lost money and should have charged \$1.00 for each bar.

Nancy argued that they did make money and might have sold fewer bars if they were more than \$0.50.

Do you agree with Cody or Nancy? Write a letter to the Leadership Team explaining why.

Include this information in your letter:

- Who do you agree with and why?
- How many bars were sold, how much money was made, and how you know.
- How they could make money with the bars that are left over after the Marathon.

Funneling Questions

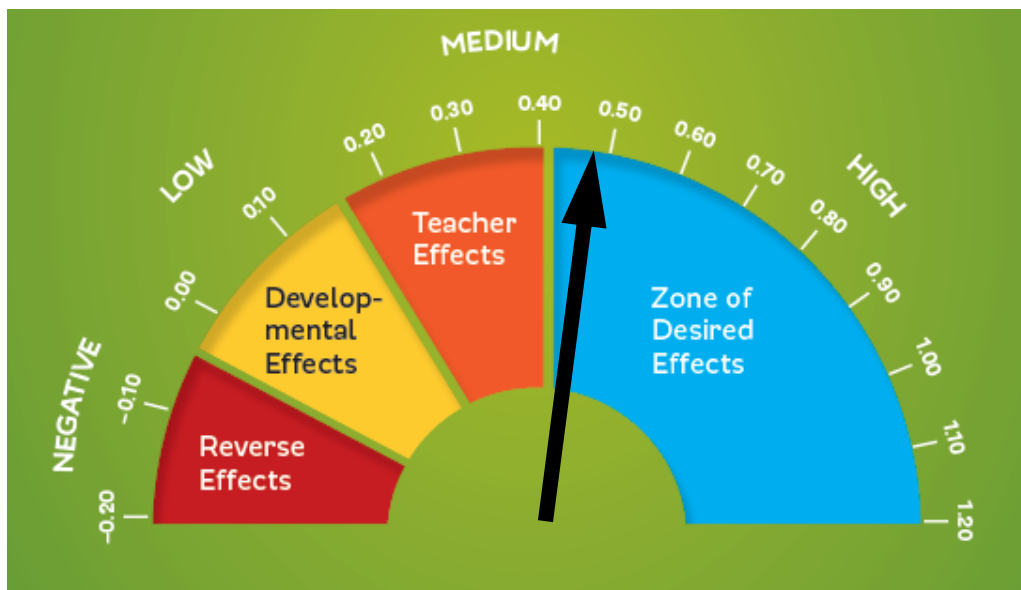
Guide the student down the teacher's chosen path.

- What if you tried *this* here?
- So you could find *this* first?
- What if you did *this* instead of *that*?

Focusing Questions

Help push student thinking forward.

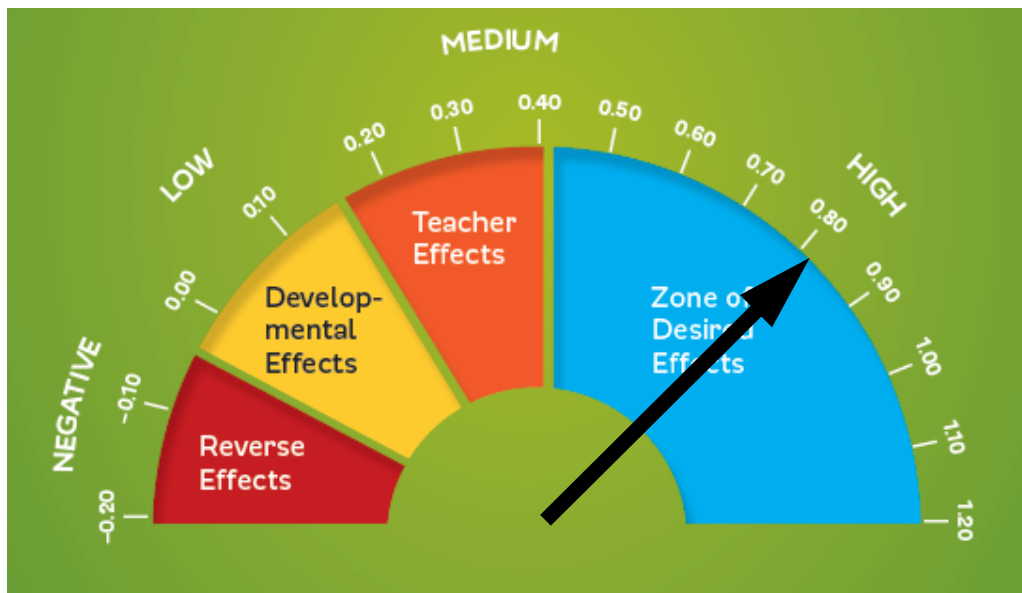
- Where could you start?
- What are you trying to figure out?
- Why does that work?
- Is there another way to approach it? To represent it?
- How are these ideas related



Effect size for questioning: 0.48

Tasks for Discourse

- Does the problem involve meaningful mathematics?
- Does the problem provide an opportunity for students to apply and extend mathematics?
- Is the problem interesting to students?
- Is the problem challenging for students?
- Does the problem support the use of multiple strategies?
- Will students' interactions with the problem reveal information about students' mathematical understanding?



Effect size for classroom discussion: 0.82

When playing the game *Fractions Difference*, is a difference that scores 1 point more likely than a difference that scores 2 points?

Points for differences

- 1 point if the difference is less than one.
- 2 points if the difference is greater than one.

Fractions Difference

Cube A

$\frac{1}{3}$	$\frac{2}{3}$	$\frac{3}{2}$
$\frac{1}{4}$	$\frac{3}{4}$	$\frac{4}{3}$

Cube B

$\frac{1}{5}$	$\frac{4}{5}$	$\frac{6}{5}$
$\frac{1}{6}$	$\frac{5}{6}$	$\frac{7}{6}$

Support Discourse with Talk Moves and Sentence Stems

Clarification and explanation

- Could you describe what you mean?

Justification

- How did you know?

Recognize and challenge misconception

- I don't agree because..
- Have you considered an alternative?

Interpret and use other's statements

- I heard Charla say...and that makes me think...

Require evidence

- Can you give me an example?

Additional Questions to Support Discourse

What decisions did you make?

Can you tell me more about...?

Can you explain a different way?

What patterns do you notice?

How does ____ relate to ____?

What can you tell me without solving the problem (performing computation)?

Rather than trying to add the numbers, try thinking about the pattern.

What do you think about Jorge's question/statement?

Who can repeat what Jessica said in their own words?

Discourse and Metacognition – Teacher Questions

Tell your partner what you think the problem is about.

Make a list of the things you understand about the problem.

Make a list of the things you understand about the problem?

Self-questioning

- What do I know about the problem?
- What is the problem asking me to find out?
- What strategies can I use to understand the problem better?
- Have I seen something like this before?

Self-reflection

- How is my answer similar to/different from my other students' solutions?
- How do I know my solution is correct?
- How well did I communicate my thinking?
- Could I have done this a different way?
- What if...?

High Level Discourse

Teacher as facilitator, guide on the side

Student initiated talk, including questions directed to each other

Teacher guides students to contrast strategies

Students justify own thinking

Students use math drawings to describe their thinking and the thinking of other students

Students support and shape each other's thinking

References Cited

Dixon, J. K., Adams, T. L., Nolan, E. C., & In Kanold, T. D. (2015). *Beyond the common core: A handbook for mathematics in a PLC at work*.

Hattie, J., et. al. (2017). *Visible learning for mathematics, grades K-12: What works best to optimize student learning*. Thousand Oaks, CA: Corwin.

Hufferd-Ackles, K., Fuson, K., & Sherin, M. G. (2004). Describing levels and components of a math-talk community. *Journal for Research in Mathematics Education*,.

(2014). *Principles to actions : ensuring mathematical success for all*. Reston,VA:NCTM, National Council of Teachers of Mathematics,

Russell, Schifter, & Bastable. (2011) *Connecting arithmetic to algebra*. Thousand Oaks, CA: Heinemann.