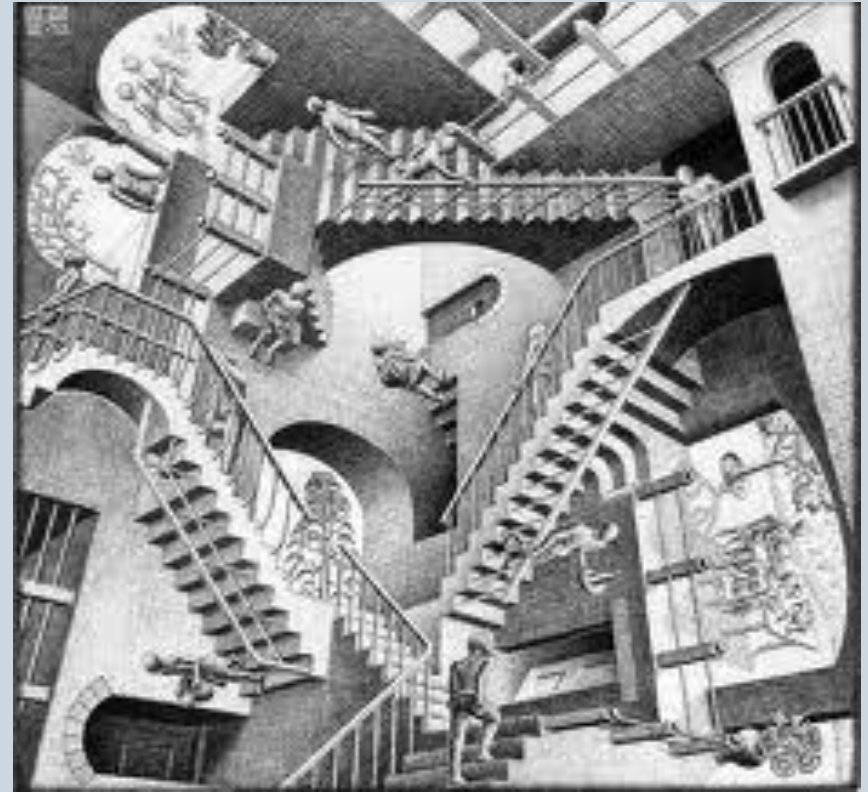


Differentiation Session 1

(Math as an example)

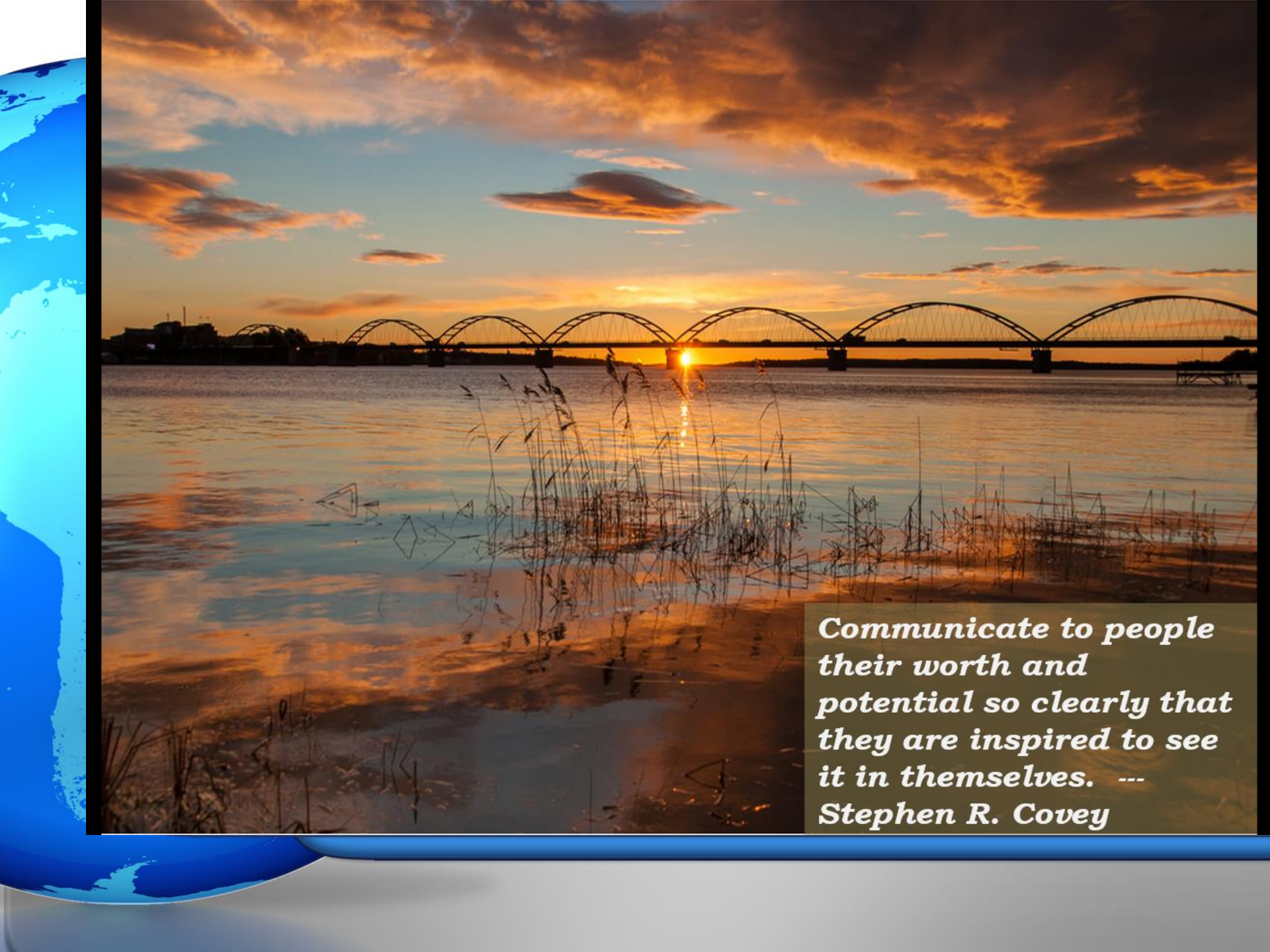


@meldernc



Michael Elder
#ncagt41 @ncagt
NCAGT Conference

www.academicinnovation.weebly.com



***Communicate to people
their worth and
potential so clearly that
they are inspired to see
it in themselves. ---
Stephen R. Covey***

DIFFERENTIATION IS

DIFFERENTIATION IS NOT

AN IDEA AS **OLD**
AS EFFECTIVE TEACHING

Lessons
designed around
**PATTERNS OF
STUDENT NEED**

USE OF
WHOLE-GROUP,
SMALL-GROUP &
INDIVIDUAL TASKS
**BASED ON
CONTENT
AND
STUDENT
NEEDS**

**TRACKING OR GROUPING STUDENTS
INTO CLASSES BY "ABILITY"**

**INCOMPATIBLE
with STANDARDS**

**VALUING
and
PLANNING
for
DIVERSITY
in
HETEROGENEOUS
SETTINGS**

Necessary
for success with
standards for a
broad range
of learners

PURPOSEFUL USE OF
**FLEXIBLE
GROUPING**

**BLUEBIRDS,
BUZZARDS &
WOMBATS**
(ability grouping
within a classroom)

**DUMBING
DOWN**
teaching for some students

Something
extra
on top of
good teaching

A SET OF
**INSTRUCTIONAL
STRATEGIES**

MOSTLY FOR STUDENTS
WITH IDENTIFIED
**LEARNING
CHALLENGES**

A **STUDENT-FOCUSED**
WAY OF THINKING ABOUT TEACHING AND LEARNING

TEACHING
UP
AT THE
CORE
OF QUALITY
TEACHING

**INDIVIDUALIZED
INSTRUCTION**

IEPs FOR ALL



Designed to
ADDRESS LEARNING & AFFECTIVE NEEDS
that *all* students have



**A SYNONYM FOR
GROUP WORK**



→→→ Learn more about the book at www.ascd.org/differentiatedclassroom.

Source: Used with permission from Carol Ann Tomlinson, author of *The Differentiated Classroom*, 2nd Edition.



What's the Area?

A square piece of paper is folded in half to form a rectangle with a perimeter of 12 cm. What is the area of the original square?



Not drawn to scale



Ground Rules for a Differentiated Classroom

- *Gathered from gifted students who reported being in a differentiated classroom.*

What would you hope for your child?

- Mistakes are okay.
- My classroom is a safe place to practice what I do not already know.
- It is okay for me to do something different from my neighbor. (Medicine Example)
- Where I begin does not determine where I end up.
- My effort matters.
- My teacher expects a lot from me.
- My teacher is always here.
- I get to learn about things that interest me (sometimes).

Let's Practice

- You are asked to prepare three friends to compete on Chopped. If any of them win they will split their \$10,000 prize with you. The only catch is you cannot compete!

Chopped - Full Episodes



Friend One: Very creative, but is a very “Meat and Potatoes” kind of girl.

Friend Two: Loves to eat a variety of foods and has traveled extensively. However, one place she has not visited much is her own kitchen.

Friend Three: Owns a restaurant featured on Diners, Drive Ins and Dives.

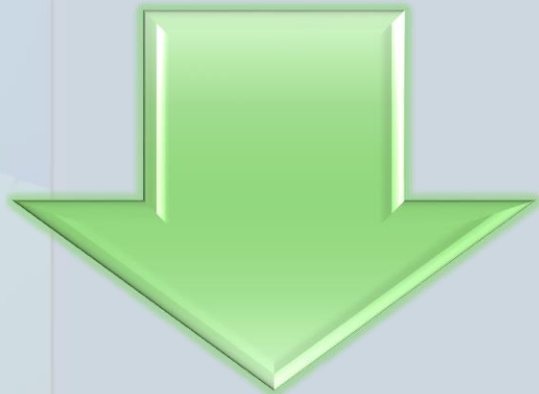
Do I have to?

This is generally considered to be conservative

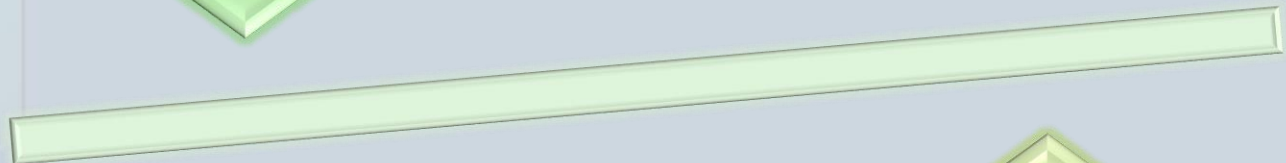
In Reading

Reading Range Levels BELOW Average						ACTUAL Student Level	Reading Range Levels ABOVE Average					
				PreK	K	Age 6 <input type="checkbox"/> Grade 1 <input type="checkbox"/>	Grade 2	Grade 3				
			Grade 1	Grade 2	Grade 3	Age 9 <input type="checkbox"/> Grade 4 <input type="checkbox"/>	Grade 5	Grade 6	Grade 7			
		Grade 3	Grade 4	Grade 5	Grade 6	Age 12 <input type="checkbox"/> Grade 7 <input type="checkbox"/>	Grade 8	Grade 9	Grade 10	Grade 11		
	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Age 15 <input type="checkbox"/> Grade 10 <input type="checkbox"/>	Grade 11	Grade 12	Grade 13	Grade 14	Grade 15	
Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12	Age 18 <input type="checkbox"/> Grade 13 <input type="checkbox"/>	Grade 14	Grade 15	Grade 16	Grade 17	Grade 18	Grade 19

The Balance & The Goal(s)



Unique Abilities, Experiences,
Needs, Learning Styles,
Background Knowledge,
Readiness, Interests, Social
Dynamics



Master Same
Concepts?
Skills?
Grow?



The How

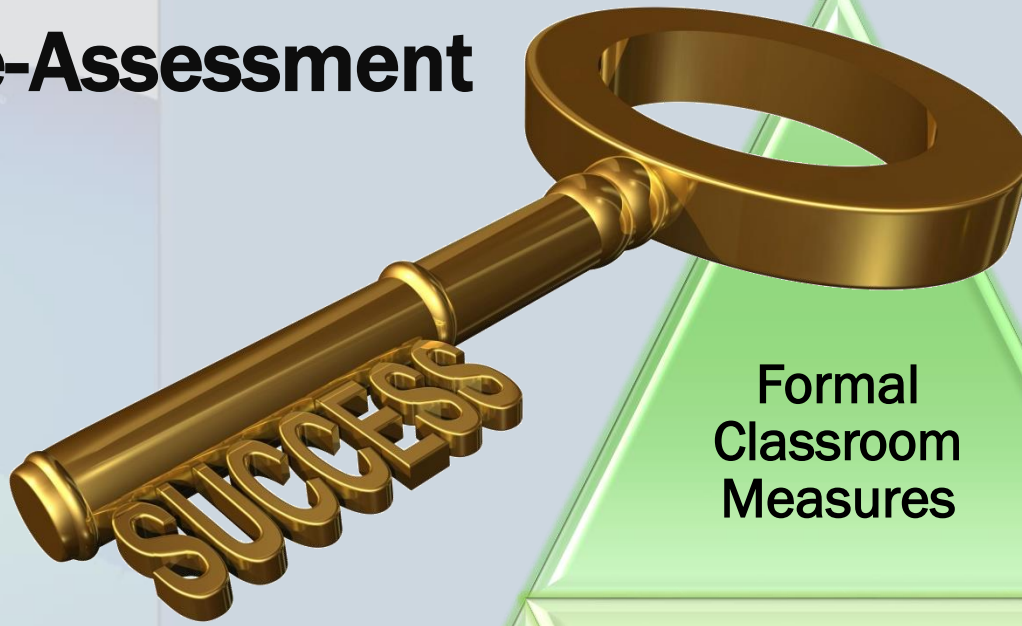
Content Process Product

(Tomlinson)

Not all at once 😊



Pre-Assessment



What are some types of pre-assessment?

Formal Classroom Measures

Informative

How do we respond?

Who should be pre-assessed?

Informal (Formative) Measures

Benchmark Interim Summative Results

Let's Talk Tools

Differentiating by Content

Q Taxons and Levels



www.quantiles.com



www.newsela.com

Grades 3-5

Quantile & Lexile Score Given for Each Child

North Carolina End-of-Grade Test
Regular Test Administration Spring 2012
Individual Student Report
Public Schools of North Carolina

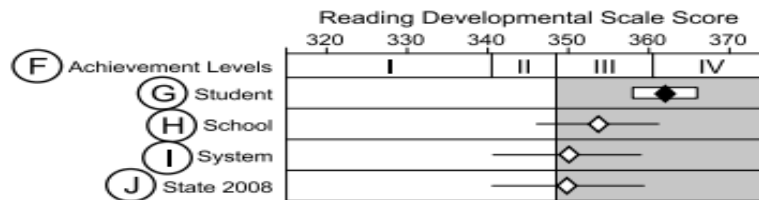
Student
Teacher
School
System

Grade Level 5

For a full explanation of the information provided in this report see: <http://www.ncpublicschools.org/accountability/policies/uirs>

Reading

(A) Scale Score 362
(B) Percentile Rank (2008) 90
(C) Achievement Level IV
(D) Lexile Framework® for Reading¹ 1235L

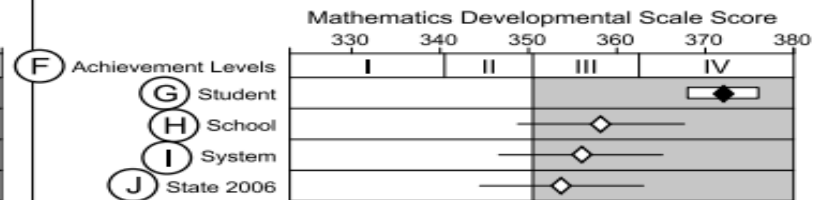


(K) Students performing at this level consistently perform in a superior manner clearly beyond that required to be proficient at grade level work.

Students at Level IV demonstrate a highly proficient understanding of grade-level skills and comprehension as required in the North Carolina *Standard Course of Study* at grade five. Students comprehend a greater variety of fifth-grade texts, such as fiction, nonfiction, poetry, and drama. Students achieve a higher level of comprehension by predicting, questioning, evaluating, analyzing, justifying, integrating, critiquing, and making judgments about elements of text. They also identify elements of fiction and nonfiction by referencing the text for author's choice of words, plot development, figurative language, and tone. Students make multiple connections within and between texts by recognizing similarities and differences based on a common theme or message. Students are also able to cite supporting evidence when evaluating such elements as character, plot, and theme.

Mathematics

(A) Scale Score 372
(B) Percentile Rank (2006) 98
(C) Achievement Level IV
(E) Quantile Framework® for Mathematics² 1040Q



(K) Students performing at this level consistently perform in a superior manner clearly beyond that required to be proficient at grade level work.

Students performing at Level IV commonly show a high level of understanding, compute accurately, and respond consistently with appropriate answers or procedures. They demonstrate flexibility by using a variety of problem-solving strategies.

Students consistently demonstrate number sense for rational numbers 0.001 through 999,999. They consistently demonstrate ability in the addition, subtraction, comparison, and ordering of fractions, mixed numbers, and decimals. They correctly estimate the measure of an object in one system given the measure of that object in another system. Students commonly identify, estimate, and measure the angles of plane figures and commonly identify angle relationships. They consistently identify, define, and describe the properties of plane figures, including parallel lines, perpendicular lines, and lengths of sides and diagonals. Students are commonly able to identify, generalize, and extend numeric and geometric patterns. To solve problems, fifth-graders at Level IV consistently organize, analyze, and display data using a variety of graphs. They consistently use range, median, and mode to describe multiple sets of data. Students commonly use algebraic expressions to solve one-step equations and inequalities. They commonly identify, describe, and analyze situations with constant or varying rates of change.

¹ A Lexile® measure represents a student's reading ability and can be used to match the student with books and other materials at an

Most Difficult First

- Share the most difficult task or problem(s)
- Students who can demonstrate precision and accuracy do not need the additional practice

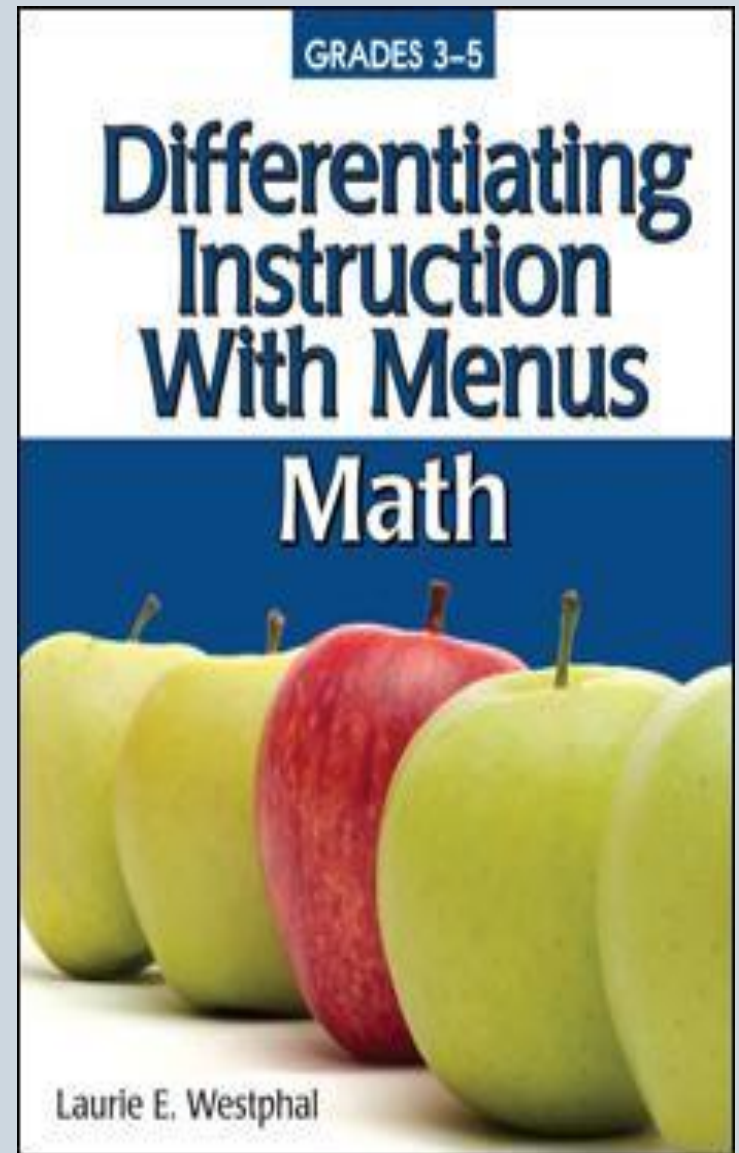


Choice and Menus

- The Power of Choice
 - Choice:
 - Preferred Learning Styles of Gifted Kids
 - Choice only option that allows a teacher to meet a variety of student needs
 - Greater sense of independence
 - Increased Focus
 - Greater Completion Rates
 - Kids and People do not always know what they want

https://www.ted.com/talks/malcolm_gladwell_on_spaghetti_sauce

Also available for Language Arts, Science, Social Studies and for Inclusive Classrooms



Tic-Tac-Toe Menu

(Choice Menu One)





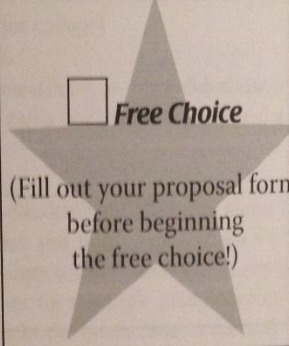


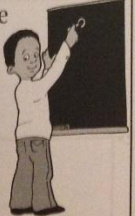
Characteristics

- Eight Choices
- One Free Space
- Same Level of Bloom's
- Same Weight for Grading
- Flexible
- Can be limiting for students



Name: _____

Adding and Subtracting Fractions

<input type="checkbox"/> Make a Map Create a map of your playground using a scale of every 3 feet equaling $\frac{1}{4}$ of an inch. Present your map on a poster. 	<input type="checkbox"/> You Create the Problem! Create a cube with six word problems using fractions. Include three addition and three subtraction problems. 	<input type="checkbox"/> You Sing It! Create a song or rap that tells the steps to follow when adding or subtracting fractions. 
<input type="checkbox"/> You Design it! Design a worksheet where you show how to add and subtract fractions. Include some practice problems. 	<input type="checkbox"/> Free Choice (Fill out your proposal form before beginning the free choice!) 	<input type="checkbox"/> You Play it! Make a board game that tests your classmates' knowledge of adding and subtracting fractions. 
<input type="checkbox"/> Create a Collage Using pictures from magazines, design four fraction word problems on a poster. Use the pictures to show how to complete each problem. 	<input type="checkbox"/> You Teach It! Create a lesson for the class that teaches the addition and subtraction of fractions. Use manipulatives and allow your classmates to practice their skills! 	<input type="checkbox"/> A New Border Your teacher wants to put a new border around the classroom. He or she will need accurate measurements, down the closest $\frac{1}{8}$ of an inch. Measure your classroom and record the exact amount of border your teacher would need.

Check the boxes you plan to complete. They should form a tic-tac-toe across or down.
 All products are due by: _____

Check List (List Menu)

(Choice Menu Two)

Characteristics

- Challenge List
- At least 10
- Predetermined Choices
- Weighted Scoring
- Based on Bloom's
- Responsibility
- Few Topics
- No guarantees



Name: _____

Multiplying and Dividing Fractions

Guidelines:

1. You may complete as many of the activities as you would like listed within the time period given.
2. You may choose any combination of activities.
3. Your goal is 100 points. You may earn up to _____ points extra credit.
4. You may be as creative as you like within the guidelines listed below.
5. You must show your plan to your teacher by _____.
6. Activities may be turned in at any time during the working time period. They will be graded and recorded on this sheet as you continue to work, so keep it safe!

Plan to Do	Activity to Complete	Point Value	Date Completed	Points Earned
	Choose your favorite recipe. Your friends have decided to prepare it for a party 50 people. Create a grocery list for the total amount of items they will need to buy.	25		
	Make an "Understanding Fractions" brochure that explains how to add, subtract, multiply, and divide fractions. Include examples.	15		
	Create a cartoon in which the main character, One Half, has to divide itself. Be creative about why this has to happen and how it takes place.	25		
	Create a number crossword puzzle for different fraction problems.	20		
	Design a PowerPoint presentation that teaches students how to multiply fractions. Include various examples.	20		
	Create a collage that shows various examples of using fractions in our daily lives.	15		
	Create a set of concentration cards that match multiplication and division problems with their answers.	15		
	Write a children's story about a fraction that has to keep multiplying.	25		
	Create an advertisement for a new machine that will complete a student's fraction problems for them. Explain how the machine works.	20		
	Your school librarian has asked your class for some help on the purchase of some new bookcases with two shelves each. She has 300 new books she needs to shelve. One half of the books are half an inch thick. One third of them are one fourth of an inch thick, and the rest are three fourths of an inch thick. Her shelves are 30 inches long. How many bookcases should she buy? Show your work.	30		
	Free choice: Must be outlined on a proposal form and approved before beginning work.			
Total number of points you are planning to earn.				Total points earned:

I am planning to complete _____ activities that could earn up to a total of _____ points.

teacher's initial

2-5-8 Menu (Choice Menu Three)

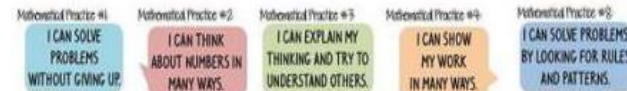
Characteristics

- Two Choices (2 points)
- Four Choices (5 points)
- Two Choices (8 points)
- Based on Bloom's
- Generally limited to one topic
- Set Point Value/Target

Source:

<https://teacherleaders.wordpress.com/2014/06/28/standards-based-choice-assessment/>

2-5-8 Integers Menu



Directions: Choose activities from the menu below for a total of **15 points**. Place a checkmark next to each box to show which activities you will complete in one week's time. Midweek I will meet with you to discuss your progress, provide feedback, and finalize the presentation format.

2 POINTS – Knowledge & Comprehension

- Activity #1 Identify two, different real-world situations where positive and negative integers occur.
- Activity #2 Using examples, describe how absolute value is applied to adding integers with both the same signs and with different signs.

5 POINTS – Application & Analysis

- Activity #1 Model adding integers with both the same and different signs using a number line *and* integer chips. Model subtracting one negative integer from another negative integer using zero pairs.
- Activity #2 Investigate common mistakes that are made when adding integers with different signs. Provide examples of those mistakes, then describe and correct the errors.
- Activity # 3 Create and solve two subtraction problems using three variables as integers. See example below:

Example: $a =$ negative integer of your choice, $b =$ negative integer of your choice,
 $c =$ positive integer of your choice.

$$4 - a - c \qquad |b - c|$$

8 POINTS – Synthesis & Evaluation

- Activity #1 Create two examples and two non-examples of efficiently adding at least 5 integers using the commutative property. For the non-examples describe and correct the error. Be sure to include at least two negative numbers in each example.
- Activity #2 Create and solve a real world problem where several (more than 4) integers are involved.

Baseball Menu

(Choice Menu Four)

Characteristics

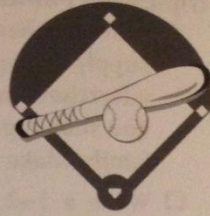
- At Least 20 Choices
- Singles (understand)
- Doubles (apply and analyze)
- Triples (evaluate)
- Home Run (create)
- Earn a certain number of runs for 100%



Name: _____

Whole Numbers

Look through the following choices and decide how you want to make your game add to 100 points. Singles are worth 10 points, Doubles are worth 30 points, Triples are worth 50 points, and Homeruns are worth 100 points. Choose any combination you want! Place a check mark next to each choice you are going to complete. Make sure that your points equal 100!



Singles—10 Points Each

- Create a set of concentration cards for appropriate multiplication and division facts.
- Count the number of students in your class, and develop six word problems involving the number of students. Submit the problems and the solutions showing all the work.
- Design an instructional poster that shows the steps for completing complex addition, subtraction, multiplication, and division problems.
- Create a mathematical crossword puzzle in which the clues are the problems.
- Create a set of four trading cards: one each for multiplication, division, addition, and subtraction.

Doubles—30 Points Each

- Create a brochure about how mathematics is used in our everyday lives.
- Write a poem or jingle that shares the steps to solve a math problem using two-digit numbers.
- Create a cube with a different word problem on each side.
- Complete two Venn diagrams. One will compare and contrast addition and multiplication, and the other will compare and contrast subtraction and division.
- Make a board game to reinforce multiplication and division problem-solving skills.
- Design a book cover for a book about using multiplication in our everyday lives.

Math Success Mindset

- Thinking first...Developing an “I can” mindset
- Replace ‘buts’ with ‘and’ and move from complaints to solutions...
- I’d like to do my homework, but I don’t have time.
- I’d like to do my homework, and I don’t have time, so I will...
- I’d like to do better in math, but I only like science more.
- I’d like to do better in math, and I only like science, so I will...
- *I want to differentiate math, but...*
- *I want to differentiate math, and... so I will...*

Open Ended Questions

- Number and Operations:
 - K: What makes 5 a special number?;
 - 2: A two-digit number has more tens than ones. What could the number be? How do you know your number is correct?
- K-2 Geometry: Use any four tangram pieces to build a shape that looks like a house. Use geometry words to describe your house.
- 1-2 Measurement: How many baby steps are there in a giant step?;
Describe 3 things that weigh less than a shoe. Tell how you know they weigh less than a shoe.
- K-1 Algebra: Write three equations involving addition that are true and three that are not true.;
Create two different stories that the equation $5 + \quad = 9$ could describe.
- *Credit to Marian Small
(Great Ways to Differentiate Mathematics Instruction)*

Parallel Tasks

- Third Grade Data:
The set of data below describes the ages of a group of people at a family party (32, 30, 5, 2, 1, 62, 58, 28, 26, 25, 24, 2, 4, 39, 16)
Choice 1: Create a line plot to display the data
Choice 2: Create a bar graph to display the data
- Third-Fourth Grade Number and Operations
Choice 1: Two fractions are equivalent. If you add the numerators, the result is 22 less than if you add the denominators. What could the fractions be
Choice 2: Draw a picture to show equivalent fractions for $\frac{2}{8}$.
- Third-Fourth Grade Algebraic Thinking:
Will Rebecca and Ethan ever have the same number of stickers?
How many stickers would that be?
Choice 1: Ethan has 30 stickers and Rebecca has 12. Ethan gives Rebecca 3 stickers at a time.
Choice 2: Ethan has 50 stickers and Rebecca has 10. Ethan gives Rebecca 5 stickers at a time.
- *Credit to Marian Small (Great Ways to Differentiate Mathematics Instruction)*

Other Content Differentiation Strategies

- Tiered Activities
- Open-ended activities
- Higher level questions
- Bloom's Taxonomy
- Curriculum Ladders
- Students as Experts
- Increase the complexity
- Decrease the structure

Change the Process Strategies

- Pre-testing
- Curriculum Compacting
- Tiered Activities
- Most Difficult First
- Alternate Assignments
- Learning Contracts
- Independent Study
- Learning Centres
- Anchor Activities
- Discovery Learning

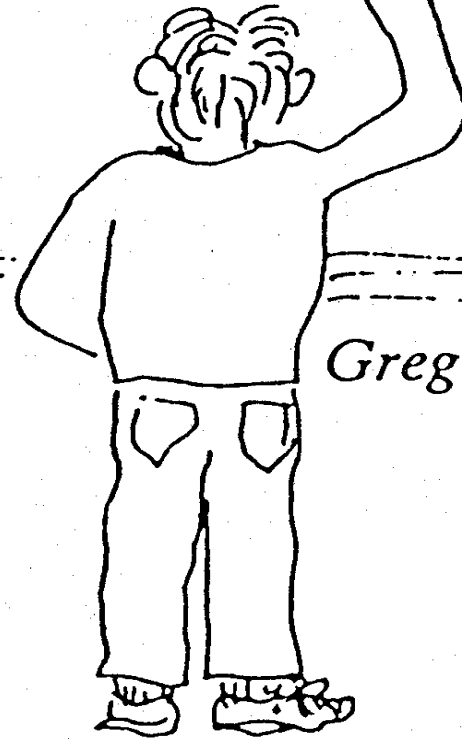
Change the Product Strategies

- Choice Boards
- Websites
- Tic tac toe menu
- Wikis
- RAFT (Role, Audience, Format, Topic)
- Podcasts
- Game Show Menu
- Movie Making
- Student Choice option
- Game creation

School Decisions

$$\sum_{k=0}^{\infty} A_k x^k = \sum_{k=0}^{\infty} \sum_{n=0}^p (k^n) x^k = \sum_{n=0}^p \sum_{k=0}^{\infty} (k^n) x^k = \sum_{n=0}^p (1+x)^n =$$

$$\frac{(1+x)^{p+1} - 1}{(1+x) - 1} = \frac{1}{x} \{ (1+x)^{p+1} - 1 \} = \frac{1}{x} \{$$



Greg K. Gibbs

And the teacher says; "Yes I know he's gifted, but if I put him in the next book what will they do with him in 4th grade?"

Pulling It All Together





Marian Small (2012):

Good Questions: Great Ways to Differentiate
Mathematics Instruction (*Open Questions and Parallel
Tasks*)

Cathy Seeley (2009):

Faster Isn't Smarter (Messages about Math, Teaching,
and Learning in the 21st Century)

Laurie E. Westphal (2007)

Differentiating Instruction With Menus: Math



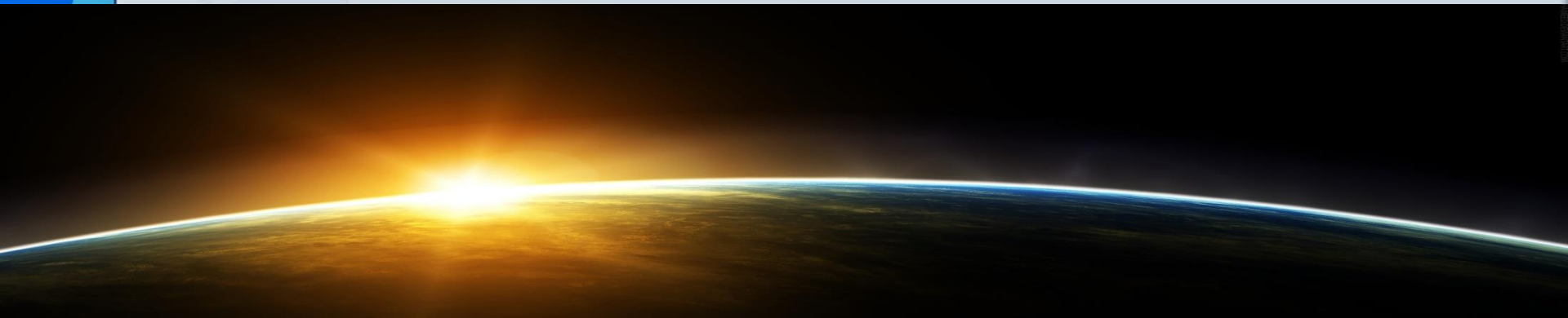
On the Horizon



EARTHRISE

Differentiation is a mindset rather than a set of strategies.

We all need strategies, but at it's heart, differentiation is considering that for some students their perspective is more like watching the Earth-rise rather than the sun-rise.



• Digital Tools

- Thanks to Shari Estep (Onslow County)
 - <http://www.livebinders.com/play/play?id=1643410>
- Math Playground (especially Thinking Blocks)
 - <http://www.mathplayground.com/thinkingblocks.html>
- Quantiles (shared earlier)
 - <https://quantiles.com/tools/quantile-teacher-assistant/>
- Gifted Links Compiled Symbaloos
 - <http://onslowaig.weebly.com/gifted-links-symbaloo.html>

Today's Presentation and Past Presentations:

<http://onslowaig.weebly.com/gifted-conference-presentations.html>

Thank You

